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An Article by Dr. Siegfried Balke, Cabinet Minister of the German Federal Republic

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BATTELLE TECHNICAL REVIEW

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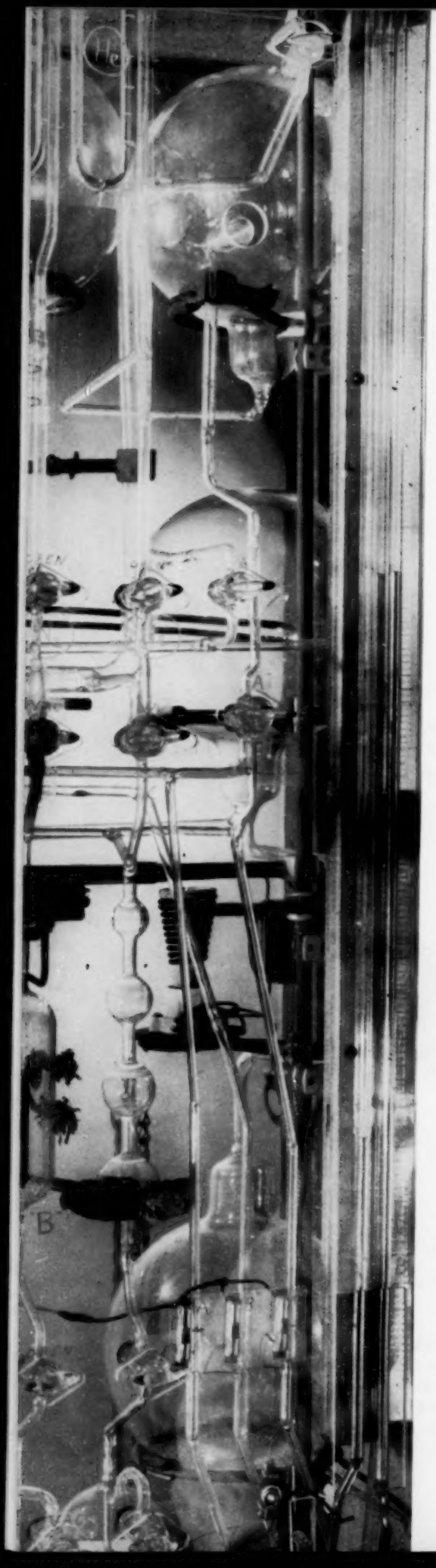

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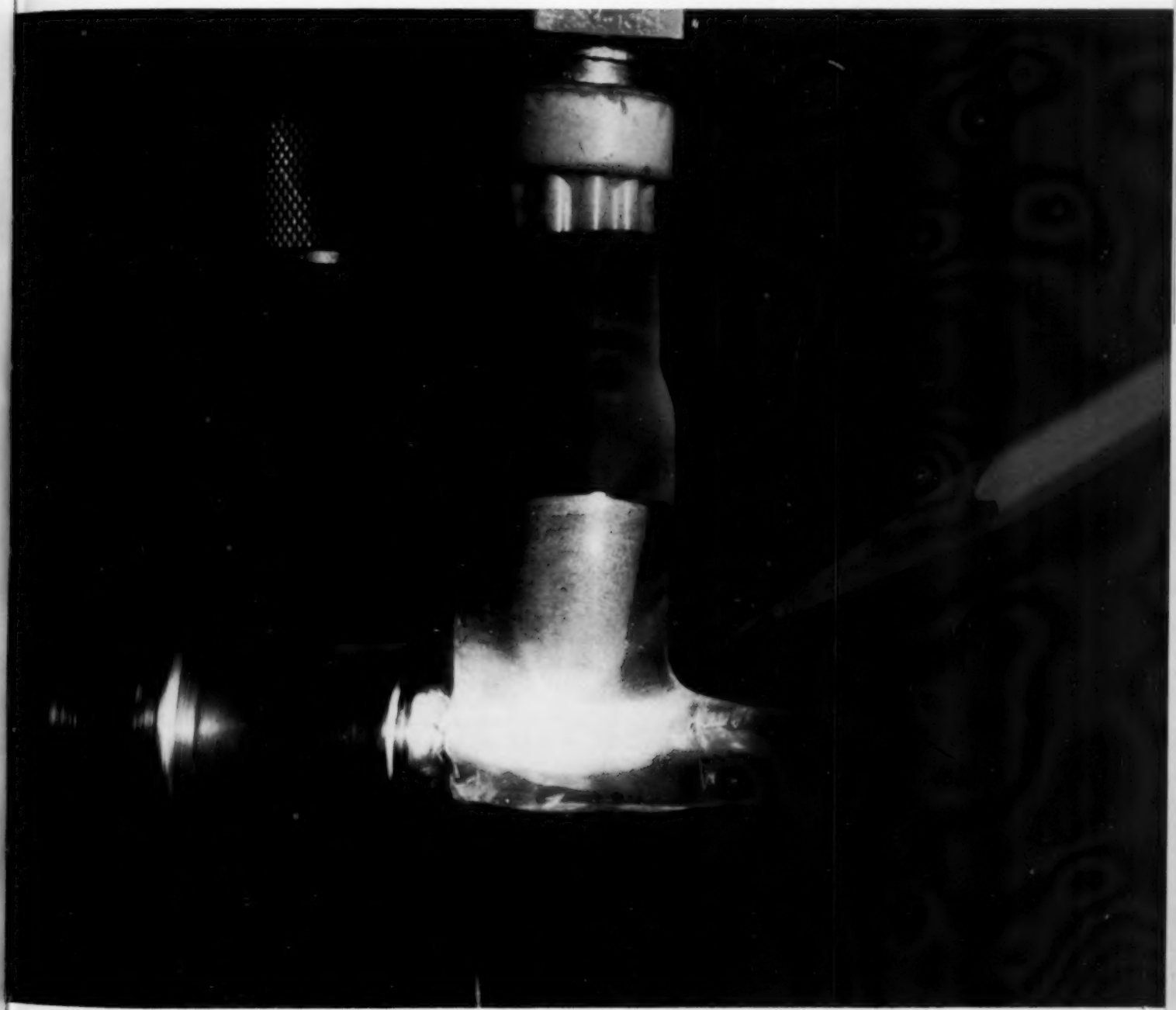
357a Battelle Technical Review Abstracts

Abstracts of articles and papers in a wide variety of technological fields from more than 1350 journals published throughout the world. Abstract selection largely reflects the primary areas of Battelle research.

Today's technology often calls for unusual welding methods. This apparatus is designed to enable welding technologists to make welds on very thin metal. A built-in micrometer provides such close control of the arc length that metal only .004 inch thick has been welded successfully. The glass-enclosed arc allows control of atmosphere and makes possible the welding of various metals.



DELICATE WELDER

VIGNETTE

CERAMIC SCIENTIST

BURNHAM KING

As it is concerned with problems ranging from the chemistry of oxides at high-temperature to the properties of colloidal materials in suspension, ceramic research might be called a "catch-all" according to Burnham King, ceramic scientist at Battelle. Moreover, he points out, in ceramic studies there are often so many variables to be pinned down that experimental evaluations are needed in order to get a basis for research. Ingenuity is frequently an all-important factor in bringing investigations to successful conclusions. In ceramics, as in other technical fields, such success often calls for unique as well as standard equipment in the laboratories and the availability of both special and broad overlapping skills.

Burnham, who was recently elected Chairman of the Enamel Division of the American Ceramic Society, has participated in and directed at Battelle a broad spectrum of studies touching various ceramic problems. His work in the field of porcelain enamels has been of special significance and has led to a new theory of enamel adherence. In this area, his investigations have included the development of porcelain enamels for cast iron and sheet steel and special enamels with good electrical resistance at high temperatures. In the field of glass technology, he has participated in studies leading to the development of improved infrared transmitting glass; glass fibers with special properties; and electrically conductive glass. Other research has related to the development of colors for ceramic pigments; glazes for electronic components; ceramic-metal laminates; and ceramic coatings for bearing surfaces; electrical wire; and for metals for atomic energy applications.

Burnham gained his formal technical training from three institutions. His B.S. degree in mechanical engineering was received from Carnegie Tech, his M.S. in ceramic engineering from The Ohio State University, and his Ph.D. from the University of Illinois. While completing his studies at the latter institution, he was a member of the Experiment Station staff, where he studied porcelain enamel problems. Later, he was associated with the Harshaw Chemical Company.

On the basis of his investigations, Burnham has written more than 25 articles, has received five patents, and has four pending. His professional interests have also led to his active participation in society activities. He is a Fellow of the American Ceramic Society and a member of the American Institute of Ceramic Engineers and of Keramos. Currently, Burnham is serving as secretary of the Central Ohio Section of the American Ceramic Society.

The parents of three daughters, Burnham and his wife, Mary, recently achieved the status of grandparenthood. Of his hobbies, Burnham prefers sailing to gardening and painting.

Automation and Industrial Management

Professor Doctor Balke, Minister for Atomic Affairs and for Postal and Communications Systems in the German Federal Republic, points out that technical progress is the result of man's urge for survival. With it fewer men will do what machines can do, and more men will do what only men can do.

by Siegfried Balke

The columns of the daily papers are filled with references to the subject of automation. It has given columnists a welcome change of topic and appears to have provided doctrinaires of every shade of opinion with new, vital problems upon which to pontificate. But it can be seen at a glance that automation is a technical process that belongs in the realm of sober rationalism, devoid of any frightening mystery, and as such belongs as well to scientific industrial management.

From the profusion of attempts to bring order to the problems of automation, let me cite just one example. Numerous national and international conferences are considering the problems of the automatic factory. At the June, 1955 conference of the Institution of Production Engineers, held in Margate, five chief problems were posed:

1. What new technological facts make automatic production possible?
2. In accordance with what technological points of view can they be applied practically?
3. How are the unions and management reacting to this development?
4. What influence will it have on the intellectual development of the rising generation, and on the material and cultural standards of living?
5. Are we really on the threshold of an industrial revolution, and will we come through it well or badly?

One could go on and pose other potential questions, but they would all tie in with these same five points.

Mechanization and automation are as old as technology itself. Automation is the automatic coordination of various interrelated operational steps. The tendency toward automation appears as a natural developmental principle in every machine. Automated production processes are basically nothing new. I need not list individual examples for this audience; however, the production of cigarettes and newspapers, which we take for granted, are already automated or highly mechanized processes.

Concepts of Automation

There are two different concepts of automation: In the narrower sense, automation encompasses all engineering measures that replace or increase human labor power. It differs from mechanization, which replaces the physical effort of the human being, in that it adds the element of automatic control, and thereby eases the demands on the human mind. Even when machines and devices are used, as contrasted with the use of tools in which the output is directly proportional to the labor input, man is still only the element that sets the machine in motion. His chief responsibility is to control the operation of the machine's adjustments, to regulate, to prevent breakdowns, etc.; in other words, production control. Under the influence of American technology, these functions are being automated.

The extreme in this development, which of course plays a greater role in wishful thinking in literature than in actual practice, is the dream factory, devoid of

human production personnel, transforming a raw material into the desired finished product without human labor.

There is today a more theoretical concept of automation in a broader sense. In this sense it deals with control and direction of economic processes including not only technical production processes or single factories alone, but also the whole complex of an enterprise and ultimately the whole national economy. The terminology, as you know, was created by John Diebold in his book *Automation, the Advent of the Automatic Factory,* which appeared in 1952. He calls automation a basic transformation of the philosophy of production. In his terms, production becomes a unified process embracing the whole cycle beginning with the raw material and proceeding through the application of labor and capital to the finished product.

The aim of automation is to make the production process as independent of human intervention as possible, including the gathering, computing, and analyzing of figures and data, so that the whole plant operation becomes integrated into the form of a unified production cycle. I shall mention only a few of the numerous examples—automatic assembly machines in automobile factories, the manufacture of steel-jacketed shells, the automatic dial telephone, and the automatic wiring and assembly of electronic devices.

1. Automation of the production processes—a typical example—the continuous processes in the chemical industry.
2. Automation of production machinery, i.e., the further development of mechanization. As for example in the machining and machine tool industry's assembly lines.
3. Automatic production control, what we call control and regulation.
4. Automation of mathematical computation, the famous electronic brain.

The fourth of these measures, with which we are here concerned, is not limited to any specific industrial field, since it provides a new, basic process which is of value to all the branches of industrial economics and administration that require mathematical computation. Therefore, it is with this process, which I have endeavored to fit systematically into a larger framework, that we are at present concerned.

Cybernetics and Data Processing

The scientific basis for automatic control systems is provided by cybernetics. This concept had already been created by Ampère in 1845 as the science of civil administration, and was introduced to technology by Norbert Wiener in 1948. His well-known book appeared this year in the German translation under the title of *Mensch und Menschmaschine.* Cybernetics, the concept of the science of management, encompasses any operation based on information, in other words what we currently call control and adjustment.

Control is based on previously experienced values; regulation or adjustment is based upon observed values. In the case of control, the magnitude of an impulse is conditioned by some item of information such as the closing and opening of a switch, a valve, etc. In the case of adjustment, a modification is effected through the observation of the operation, i.e., the deviation from the originally expected value produces a new item of information that affects operation through control. Cybernetics is thus a branch of general communication, based upon information.

An approximate division of this information technology would indicate that information is exchanged between subject and subject, subject and object, object and subject, and object and object. The latter group concerns us here.

Automation of industrial control functions consists of replacing a human being with an apparatus in that reasoning process which is based upon statistical data. Thus, the principle of the automatic factory is the application of the essentials of cybernetics to the production process. In the flow of any production process, inclusive of every scientific coordination, signals derived through an information center can be introduced to either control or adjust. An example with which all of you are familiar is the automatic volume control on your radio receivers which measures the volume and then adjusts it.

Laymen become excited by the expression "automation" primarily when thinking of the so-called electronic brain, which has nothing to do with the automation of the production processes.

Electronically operated automatons can also be used in clerical work and administration, and with even less risk than in manufacturing, since the application is much broader than that of specialized contrivances for manufacturing processes. Bookkeeping, payroll, statistics, inventory taking, and warehouse keeping, etc., are all areas wherein various types of electronic computers, ranging in ability from arithmetic to higher mathematics, may be used.

The electronic data processing machines, which can be used in all kinds of computing, are the most evident form of automation. The future possibilities of this technique, which is familiarly known in the U. S. A. under the title of "Integrated Data Processing", include all aspects of an enterprise through which automatic production in the technical and scientific

sense would be directed and would make possible daily balances and profit calculations.

Data-Processing Problems

These great installations are operated by electronic midgets who work economically, no longer operating from punched cards, but rather from magnetic tapes which can be filled with information and controlled like dial telephones. The difficulties of this technique lie not in the maintenance of the electronic devices but in the so-called programming of the problem—setting up the formulae and instructions for the computer which controls the operation of the electronic brain.

The technical programming is usually done by the firm manufacturing the electronic brain. The delivery of such devices may require from one to two years. In the programming, mathematical information is translated into mechanical commands. Here, also, mechanical aids have been set up in the form of a so-called program library with standard commands. These can be interchanged to make the appropriate calculations. In using this automatic aggregate, the greater the automation, the more difficult the preliminary planning work. A new type of man is needed to master these new installations and use them as tools. Feeding information into these automatic machines requires an exact knowledge of the individual operations and the coordinated operation of the individual components with thousands of separate parts comprising the whole.

The data-processing machine can read, write, test and check, and process certain data into definite results. But as an American expressed it, "The electronic brain does not think for me, but gives me time to think." A technical impasse arises at this point.

A member of Chancellor Adenauer's cabinet since 1953, Professor Doctor Balke is a man of accomplishment. His stature is reflected by his chairmanship of the Society of the Bavarian Chemical Industry, vice presidency of the Association of the Chemical Industry, membership on the executive board of DECHEMA, and leadership in other technical and industrial organizations. A longtime member of the Society of German Chemists, Professor Doctor Balke is the author of numerous articles in the field of chemical technology and editor of *Ullmann's Enzyklopaedie der technischen Chemie.*

The input of information cannot be fed in as fast as the computer can process it, therefore information carriers have to be developed which can feed information directly into the computer. For example: pay cards which do not have to go through the punched card stage. The original document should have imprinted on it the appropriate yes-no values which can, in part, be printed on the original or typed in later. Devices are already being tested that will print the dual figures on the document. Other equipment is being devised which will mechanically sort the coded, various-sized documents.

A deterrent to the introduction of these new clerical techniques is that competing firms will take a long time to adopt uniform document forms and codes. It is more likely that the use of uniform document forms will be limited to a single group of users at first. For example, we cannot expect a nation-wide bank check which can immediately be fed through computers. It is more likely that an individual bank will adopt a standard form. In other words, the electronic brain will be used as widely as possible.

Every routine task—and to tell the truth, they extend far into the domain of so-called brainwork—can and must be taken over by machines in the future. The merchant and manager, as well as the engineer, must learn to distinguish between the essential and nonessential. The automation of offices will serve its function only when efficiency of organization and operation have been carried as far as possible. Automation is not a purely technical problem, but rather is applicable to the total problems of organization.

Computers and Management

The use of electronic installations will counteract the organizational decentralization which has been characteristic of the past decades of industrial production. This will also present difficult psychological problems in limiting decentralized responsibility and centralized automation. The construction of technical nerve centers for manufacturing, characterized by total or partial automation of an enterprise, naturally, make the fate of the whole enterprise more dependent on the functioning of this technical installation. I cannot go into greater detail about the implications to the consumers' goods industry of changes in taste or changes in form. Only experience will show if using smaller electronic units with decentralization is more economical than centralization using larger automatic installations.

Automation, however, is not reserved for big business, even if it does require large capital outlays. There are tremendous possibilities in organization, manage-

ment, and purely technical application offered by the use of modern automation processes in small and medium-sized businesses—especially for retail trade. Small and medium-sized businesses can survive only if they keep up technically with the bigger ones. The smaller businesses will be able to use the new electronic techniques economically in the future—even if at first they continue to use the conventional punched card machines—if special offices with modern electric brains which will do the work on a contract basis are developed as we can see happening in the U. S. A.

As you know, for certain reasons not connected with economics, contract research was viewed with suspicion by the German economy, but, undoubtedly, it will become indispensable in the future in industrialized nations. In estimating the expense of office automation, it is important to realize that the actual costs of present-day processes, for example using punched-card equipment, have not yet been adequately determined. However, this does not mean that I am questioning the value of the computing departments of large businesses. American experience indicates that the cost of investing in an automatic computer in many cases can be quickly written off; for example, to take one case from many, the more rapid processing of bills makes it possible to take advantage of the discount offered.

Some Americans are also of the opinion that the modern electronic devices tie up less capital than the training of skilled workers for conventional techniques. Thus improvements can be financed from the amortization. I can only touch on the fact that capital expenditures for automation only seem to be a problem. On the contrary, applying the principles of automation to the atomic power plant just opened at Calder Hall brought the cost per kilowatt hour down to the level of conventional power plants.

The management of a retail organization is no longer limited to writing and calculating. It is more and more forced to consider the whole problem of production from market research through planning the product, financing, plant operation, and product distribution. Technical inventiveness and willingness to venture into the unknown is only one side of automation; the other is knowing the market situation and creatively taking advantage of technological opportunities.

The automatic mass production processes for a mass market also offer a new opportunity for specialized manufacture, but here again modern marketing research methods must be used. I call to your attention the "marketing" methods in the United States of America using statistical methods. These statistical methods have no historical significance but rather are used for predicting market trends.

The desire to automate comes not only from cost, but also from product considerations. Automation demands a cleaning-up of production programs, increased division of labor, concentration on fewer types, and greater specialization. This will, indirectly, affect the machine industry, since these machines will have to be produced, repaired, and maintained. This machine industry will itself become a new product on world markets. The use of automatic production implies an expanding and not a constant market.

Changing to automatic production makes comprehensive market research an absolute necessity. During the amortization period of equipment the production processes should remain as fixed as possible. Consequently, the greatest progress in automation has been made by using special machines for mass production. In other words, a prerequisite for automation is a mass market and mass consumption resulting in a rapid amortization of the capital invested through greater turnover, better calculation, and improved automation.

Problems of Cost

Capital investment for automatic production is so high that it can come only from an expanding economy, and even then only at a relatively low rate. In the U. S. A. it is estimated that automatic production requires a capital investment of about $100,000 per job as compared to $6,000 in 1945 and $11,000 in 1954 in the same type of industry. In one of our automatic petroleum refineries in West Germany the investment comes to about DM 150,000 per job instead of DM 30,000 to 50,000 as before. Equipping such a refinery with measuring and regulating instruments and electronic devices takes from 14 to 20 per cent of the total cost of the plant instead of about 5 per cent as before. And the introduction of automation of synthetic rubber in one of our large German chemical plants requires an investment of about DM 250,000 per job.

Investing in automation, therefore, requires an exact analysis of all production costs and working practices. This is also true in using electronic devices in management and in offices. An important part in encouraging investment is the taxation write-off provisions for depreciation, for example, in the U. S. A. over a five-year period, if I am correctly informed. Large enterprises, in particular specialized industries, will be profitable in the long run only if they are fully automatic. This will compensate for raw material and labor costs which have risen in the last few years and will continue to rise in the future faster than the price of finished products.

The difference between selling and production costs has to be compensated for by stepped-up efficiency, i.e., by increased productivity. Automation is only one aspect of efficiency. However, automation is something more than an assembly line conveyor system composed of operating units or groups—you are all familiar with examples from the metal-working industries—i.e., of groups consisting of conventional machines. Automation requires changes in technological procedures. For example, radio receiver construction could be mechanized, of course, continuing to use the conventional "insides", by robots with hands, soldering irons, etc., but this would not be feasible economically. In automation, such devices are assembled by printing the circuits on an insulated base and then making the finishing connection. This is a change in procedure required by automation.

The whole field of automation planning—including the programming and scientific analysis of plant operation—is made possible by planning research, known in the U. S. A. as Operations Research. Among things to consider in this respect (which I can mention only superficially), are the plant layout and buildings which must be adapted to automatic manufacturing; the organization of the whole enterprise with all its functions; the marketing relationships and the production planning dependent on them; the assembling operations; computing and accounting; and even social problems.

Automation is not the forming of conventional machines and electronic control and regulating devices. Disregarding this fact has already resulted in much unnecessary waste of investment. Automation also presents many problems of cost and plant operation which go beyond purely technical points. Automatic control processes when applied to high labor-cost operations has the aim of increasing the productivity per labor hour; and when applied to expensive material processes has the aim of eliminating waste. Also, the costs for control and supervision, the operating costs for an electric brain, will be determined by the use of automatic control units.

Automation, among other things, has the advantage that warehouse keeping, for the most part, can be replaced by the assembly line. As an example I need only mention modern automobile manufacturing. A danger of these integrated production processes is that a defect in a single machine of a single aggregate will interrupt all production. In the U. S. A. this is handled by so-called segmented automation, by which supplies can be switched between the individual automatic installation and thus bypass a defective unit.

European Computer Center

"Automation and Industrial Management" is the text of an address presented by Professor Doctor Balke in the fall of 1956. The occasion was the dedication, in Frankfurt, Germany, of the first electronic computing center in Europe.

The computing center is housed in a new 30,000-square-foot building provided by Battelle at its Frankfurt laboratory. Remington Rand installed the equipment and operates the center. It is meant to serve scientific, commercial, governmental, financial and managerial organizations in Western Europe on a contract basis. It likewise augments the contract research efforts of Battelle's Frankfurt laboratory.

Heart of the center is Remington Rand's Univac computer, a complex electronic system that performs mathematical computations at extremely high speeds. The Univac system transfers 13,000 symbols per second from magnetic tape, memorizes 12,000 numerical or alphabetical symbols, and releases the results in fractions of a second as they are required.

Results are printed by a high-speed component at the rate of 600 lines of 130 characters per minute, a speed more than 200 times faster than that of an average typist. In all these operations, the computer is continually monitored for errors by its own built-in self-checking features.

The concept of automation, however, is not the same as push button service. Introducing an automatic mechanism into an existing, producing setup, whose tempo differs from that of the automatic mechanism can even cause serious disturbances in production. Many of the goals of automation can be achieved by organization—first, all possible means of improving procedures and planning, and reducing costs in general, should be taken before automation is tried.

All automatic devices, even those which can solve so-called logical problems can only improve on individual functions of the human brain, but cannot replace the creative human spirit. The mathematicians among you undoubtedly are acquainted with Church's theorem, presented in 1936, in which he says that in general there is no determining process and there can be none for the propositional calculus. From this it is possible to conclude that to counteract the over estimation of cybernetics there can never be a systematic or mechanical process for solving all mathematical problems; in other words, machines will never be able to replace mathematicians.

I am convinced that the assembly line based on the mechanical interplay of production factors will be gradually replaced by a new spiritual cooperation with small business taking part in the national economy; and automation may even lead to the breakdown of extreme rationalism with its negative effects on mankind. This brings me to what is probably the most difficult problem which automation of industry presents—the position of the working man. I cannot discuss this problem in the limits of any short summary. It is one of the most important and pressing problems of our times.

We are not on the threshold of an industrial revolution as many would have us believe. Automation is not a purely mechanical process. It also consists of organizational problems which cannot be solved purely on the basis of efficiency, since they contain a strong psychological component, as well as questions of personnel relations and staff guidance. Organizational problems, which must be solved as automation progresses, are the very ones in which we are still behind, so that no revolutionary changes in this field of scientific management are imminent. The unrest spreading among the public concerning this problem has no foundation.

Man is in the process, as so often in his history, of improving the tools at his disposal. That is not revolutionary, but rather a normal process which, despite all the dramatic events which are connected with the names of technical and scientific pioneering achievements, discoveries, and human sacrifices is still only a logical development. Technical progress is the result of man's urge for survival; however, it will not bring into existence the dream factory, operating without human intervention; rather, fewer men will do what machines can do, and more men will do what only men can do. It is up to us to make use of the inherent possibility in technology so that man will rediscover himself.

> It is an honourable object to see the reasons of other men wear our liveries, and their borrowed understandings do homage to the bounty of ours; it is the cheapest way of beneficence, and, like the natural charity of the Sun, illuminates another without obscuring itself . . . To this (as calling myself a Scholar), I am obliged by the duty of my condition: I make not my head a grave, but a treasure of knowledge; I intend no monopoly, but a community, in learning; I study not for my own sake only, but theirs that study not for themselves. I envy no man that knows more than myself, but pity them that know less . . .
>
> **Sir Thomas Browne,** *Religio Medici*

The adhesion of finishes to leather is, in many cases, an important factor in the leather's performance. The degree of adhesion may be conveniently evaluated by bonding strips of canvas or copper to the finished side of the leather with suitable adhesives. The force required to separate the leather from the finish which adheres to the strips is then measured. With the equipment shown here, the force required can be recorded graphically as the separation takes place.

Technology and the Leather Industry

With intensifying competition from synthetic materials, leather companies are increasingly looking to improved production methods to help them retain and regain their markets. The author reviews the various leather-processing steps and indicates areas where scientific research may make worthwhile contributions.

by MAYNARD B. NEHER

LEATHER HAS BEEN AN IMPORTANT part of mankind's life since the dawn of civilization. Early man used the skins of animals for shelter and practically all items of clothing. Some primitive peoples, the Alaskan Eskimo for example, still continue this practice. The early tanning methods were crude, and the leather produced was essentially rawhide which deteriorated relatively rapidly under the influence of heat and moisture. As civilization has advanced, methods of tanning and preserving hides and skins have gradually improved. Today, leather is one of the basic raw materials for manufacture of many items of consumer goods.

Hides and skins, the basic raw materials of the leather industry itself, are, of course, a by-product of the meat-packing industry. At the present, most cowhides used by the American leather industry are produced in the United States. In addition, an increasingly large number of these domestic hides are exported because of lack of demand in this country. Although significant quantities of goatskin and sheepskin leathers are produced in this country from imported hides, the net result is that the United States is a hide-exporting nation.

In the present period of increasing production and utilization of synthetic materials it is interesting to consider the future of the leather industry. In the past few years leather has been losing ground as synthetic materials have made inroads on many of leather's primary uses. The outstanding example is the increasing use of various synthetics for shoe soles in place of leather. The competition resulting from such technical developments has been an important factor

in creating a difficult economic period for the leather industry.

The restoration of the leather market is an end sought by all segments of the industry. Accomplishing this end, progressive leather men believe, depends to a large extent upon the improvement of the chemical and mechanical processes so as to cut their product's cost and improve its quality, thus making leather more competitive with other products.

Some companies, acting in this belief, are taking the lead in improving their manufacturing processes. Through their actions, they are helping to hasten the day when leather making will be a modern technology rather than primarily an art. Such a shift, bringing with it more effective processes and controls, increased mechanization, and greater efficiency will benefit the entire industry.

Currently, profits of leather companies are generally low, making their task of financing improvements difficult. However, with gradual advance, the industry should be able to pull itself out of its present difficulties, and research can be one important part of this effort.

Although leather is a by-product of the meat-packing industry, the two industries are completely separated. It might seem that a combination of the two would be ideal, but there is such variation in the quality, size, and type of hides produced, and such specialization by tanneries, that this simply is not feasible. Hides are handled through brokers who buy and sell according to the qualities of the hides and requirements of the tanners.

Pre-tanning Steps

It is necessary to provide a means of temporary storage of the hides after they are removed from the animals and until they are actually tanned. In the United States most hides are preserved by salting. In the warmer climates of India and Africa hides are cured by drying in the sun.

In most cases the pre-tannery processing of hides needs to be improved. The handling of hides in many slaughter houses is carried out in a very inefficient manner. Common complaints of tanners are: (1) The hides are not properly removed from the animals and may be damaged by "butcher" cuts, or may contain too much fat or flesh, (2) the hides are not cured soon enough or thoroughly enough to prevent bacterial decomposition, (3) the hides contain "stains" caused by impure salt or other contamination.

A new process for handling cowhides has recently been announced. This process involves "green fleshing" of the hides at the slaughter house instead of at the tannery. It apparently represents a decided improvement in the industry, producing cleaner, lighter, more easily sorted and more easily processed hides.

This new process is a result of research. Research can point the way to other and more far-reaching improvements in hide processing techniques. Several years ago a machine was designed and built for removal of the useable portion of hogskins without cuts. Development of a similar machine for cowhides could result in better, more valuable hides, and, at least for the larger packers, would represent a real advance.

Salt is an efficient preservative for hides; however, it is not without its drawbacks. Much difficulty has been experienced in the industry with salt stains. Other preservatives which do not need to be used in such large quantities might be an improvement. Experiments are now under way with refrigeration as a means of temporary preservation of the hides. Solvent processing as a means of dehydrating rawhide, could also facilitate hide handling. Rawhide dehydrated in this manner might contain as little as eight per cent water, should be stable in storage, and being much lighter would be much less expensive to ship (since water and salt make up about 50 per cent of the weight of "dry" salted hides). Application of these ideas will require research to determine both their economics and how they would effect subsequent tannery processing of leather.

Tannery processing of leather varies considerably from one tannery to another and from one type of leather to another. The flow sheet on page 11 illustrates typical shoe upper, sole, and upholstery leather processing. The processing can be visualized as divided into "wet" operations and "dry" or finishing operations. The "wet" operations include the beamhouse processes, in which the hides are prepared for tanning, and the tanhouse or tanyard processes, in which the hides are tanned, lubricated and perhaps mill dyed.

Dr. Neher's studies on leather at Battelle have included water proofing, finishing, and the reduction of cracking of suede. He has also participated in investigations on the effects of radiation on chemical processes; surface chemistry and catalysis; the extended utilization of iodine, shellac, and other products; and cosmetic chemistry. Prior to joining the Institute, he was assistant professor of chemistry at Ohio University. He received his Ph.D. degree in chemistry from Purdue University.

Beamhouse Processes

The beamhouse processes, the first the hides receive in the tannery, are designed to prepare the skin for tanning. The operations vary from tannery to tannery, of course, but generally follow the illustrated course. The skins are washed and soaked to remove dirt and salt and to rehydrate them, then soaked in saturated lime for varying lengths of time (usually one to four days). The lime swells the skin, saponifies part of the fat and removes the mucoid tissues. In addition, the lime bath usually contains sodium sulfide and/or other depilatory agents to loosen the hair so that it can be removed by a simple scraping operation. The skins are then washed, delimed (usually with ammonium chloride) and bated. Bating is an enzyme treatment which removes connective tissue and produces a softer, more desirable leather. Excess tissue is always removed from the flesh side of the hide by scraping, sometimes before liming (green fleshing) and sometimes after liming (lime fleshing).

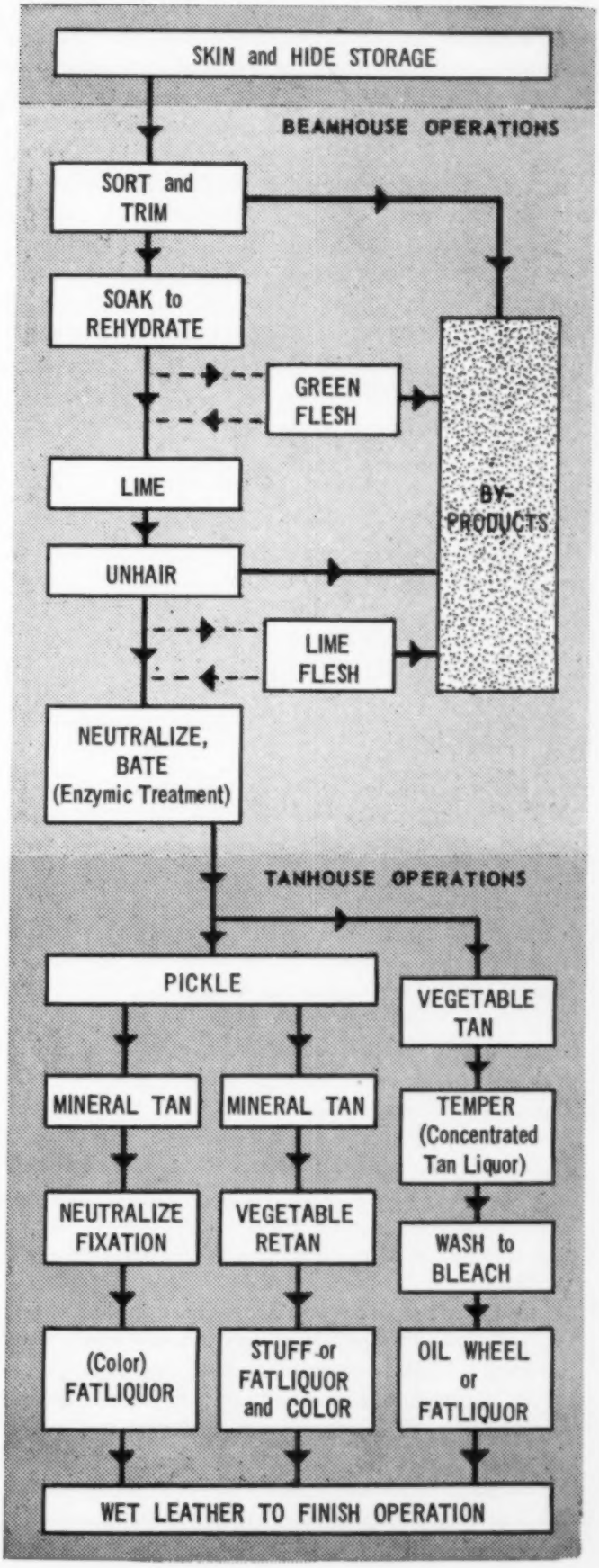
Tanyard Processes

After the beamhouse processes are completed, the skins enter the tanyard. They are first pickled in sulfuric acid (to pH about 4), except for leather to be vegetable tanned, and then tanned by drumming or soaking in solutions of tanning agents. The most common mineral-tanned leather is chrome-tanned using a basic chromium sulfate complex. Other mineral tanning agents are used but only to a very limited extent. In vegetable-tanning of leathers, various bark extracts, for example, wattle, quebracho, oak, and chestnut bark extracts are used. Combination-tanned leather is chrome-tanned and retanned with varying amounts of vegetable or synthetic tanning agents. A number of synthetic, resin-based tanning agents are also in use, for example, agents based on melamine-formaldehyde and resorcinol-formaldehyde resins. In addition, formaldehyde itself is a fairly good tanning agent for certain types of leather. However, the latter materials have not found the widespread use that the mineral and natural tanning agents enjoy, partially because of their inherent properties and also because tanners are not so familiar with them.

After tanning, the leather may be "mill" dyed by drumming in dye solutions. This operation colors both the grain and flesh sides of the leather. In other cases the retanning step imparts color to the leather. If a light-colored leather is desired, the dyeing step may be omitted.

After dyeing (or after tanning if the dyeing step is omitted) the leather is lubricated. The function of the

Tannery Processing of Leather



lubricant is to separate the leather fibers so that they do not stick together upon drying. Without lubrication the leather would dry out hard and stiff. Most leather is "fatliquored" by drumming in aqueous dispersions of oils, although some vegetable-tanned leather is "oiled" by drumming in straight oil, and some combination-tanned leather, for example military boot, hunting boot, and work shoe leather, is "stuffed" by drumming in molten grease.

The leather is again dried after being lubricated. Usually oven or tunnel driers are used, although some leather is simply hung on sticks and allowed to dry in air at room temperatures. Fatliquored leather is usually wrung and "set out" to remove part of the water and wrinkles before drying.

Areas for Research

The beamhouse processes in most tanneries are slow, and should be made more efficient to improve the over-all efficiency of the tannery process. Of course, availability of cleaner hides would reduce the time required for washing. The liming and deliming operations are usually the most time-consuming steps in the beamhouse, primarily because of slow penetration of lime into and slow diffusion of lime salts out of the skins.

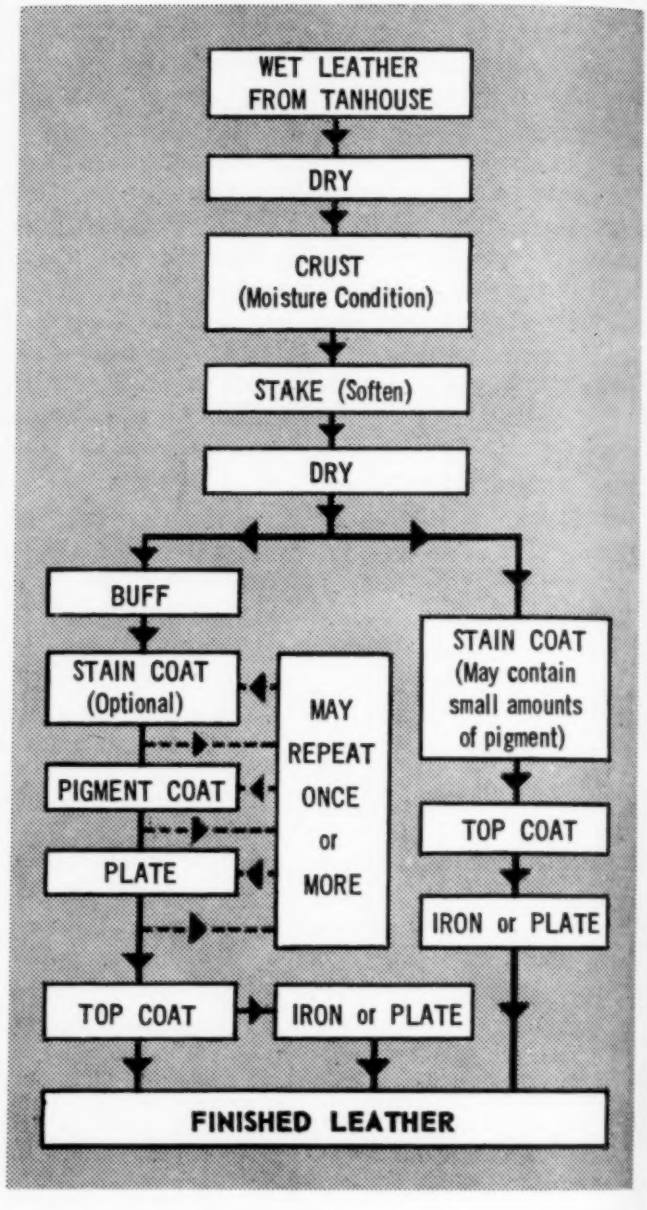
Recent research has shown that hair can be removed efficiently from rawhide by scalding. Processes based on this work may eventually replace liming for hair removal and hide preparation, thus considerably shortening beamhouse processing. An even more intriguing possibility is that scalding might be used as a processing step at the slaughter house, with the hides then shipped under refrigeration or dehydrated by solvent. If the hides were also green fleshed at the slaughter house, such a process could completely eliminate a large part of the beamhouse processing of leather. Of course, further research is needed to demonstrate the ultimate feasibility of such an innovation and to determine how the resulting hides could best be handled by tanneries.

Research may provide new and improved tanning processes. Most tanning processes in use today are based on what has been learned by chance experimentation: many processing variables are regulated purely by "art" and the judgment of someone with long experience. More fundamental knowledge of the chemistry of collagen and tanning reactions would benefit every tanner striving to develop better control of his processes.

Processing of leather with the aid of organic solvents needs to be investigated and utilized more thoroughly. In the past it has been dismissed as too costly or impractical. Other industries have found that the relatively higher investment costs for solvent processing equipment and facilities are frequently balanced by increased yield, decreased processing time and lowered processing costs. At least three leather processes based on the use of organic solvents are now being developed. They promise to give better leather at less cost, despite the solvent handling and recovery problems.

The actual tanning, fatliquoring, and dyeing operations are generally not so slow as liming and deliming; however all of these are batch operations. The use of vibration (perhaps ultrasonic) or certain surfactents to increase the rate of penetration into the hides of lime, tanning agents, fatliquors, and dyes could speed up these operations. Pickling, tanning, fatliquoring, dye-

Finishing of Leather



ing, and even the beamhouse operations of soaking, liming, deliming, and bating might thus be put on a continuous assembly line operation. Similarly the use of nuclear radiation might speed up the chemical reactions involved in tanning, or allow the use of new tanning agents to produce different or superior leathers.

Finishing Operations

After tanning, dyeing, and lubrication, the leather is ready for the final step, finishing. The purpose of the finish is to impart a desirable appearance to the leather and to provide protection from dirt pickup and wear. Finishing operations vary greatly from tannery to tannery, as do all other leather-making operations. Generally, however, leather is finished as either full-grain or buffed (corrected-grain) leather. The flow-sheet on page 12 indicates the general steps involved in finishing leather.

After lubrication, leather dried in oven or tunnel driers is usually *too dry*. It is rewet by spraying, covering with damp cloths or even burying in damp sawdust. After being moisture-conditioned, it is staked, a mechanical softening operation. Leather which has few surface imperfections is made into full-grain leather. Leather which has many surface imperfections, scratches, scars, etc., is buffed or sanded to smooth the surface and is then given a pigmented finish.

Full-grain leather is usually given a dye or stain coat to provide even coloring. It is then sprayed with one or two coats of a clear top coat, usually a nitrocellulose lacquer or lacquer emulsion.

Buffed leather is first given a dye or stain coat. (Vegetable retanned or mill-dyed leather usually has enough color and the stain coat is not needed.) It is then given one or more applications of a pigment coat, consisting of a pigment and resinous binder; two or more coats are usually applied depending upon the nature of the finish being used and the amount of coverage needed. Proteinaceous binders have been used for many years, but are being partially replaced by polyacrylate and synthetic rubber latices. The vast majority of finishes are water based, the notable exception being top coats of upholstery leather finishes.

Research on Finishing

Finishing methods are also the subject of research at the present time. The brush type application of finishes has been used for many years. It has been said many times that pigment finishes cannot be applied and be made to adhere to leather by any other method of application. However, recent years have seen the development of new and satisfactory spray application processes. For example, airless spraying does not cause rapid evaporation of the solvent (i.e., premature drying of the small droplets). Hence heavier coats of finish can be applied. Since no blast of air is used to atomize the finish, there is not so much loss of finish as with air-atomized sprays. Flow coating, which uses a very coarse spray, results in even less loss of finish. Electrostatic spraying minimizes losses due to overspraying. Also, more unconventional methods have been developed which do not require the use of water or organic solvents. These techniques have been found very useful in the coatings industry and are worth the attention of the leather industry.

The leather industry has developed basically during a period in which natural products were supreme. Today synthetic materials are becoming more and more popular. Several of these have already taken part of leather's markets. Others threaten to take even more of these outlets. Research is the only answer to the challenge which the leather industry faces.

"How does research affect the demand for goods? In three principal ways. First, by creating new kinds of goods or improved goods. The new goods encourage people to spend a high proportion of their incomes on current consumption—in other words, to save a smaller proportion of their incomes. Second, by increasing the need for machines and buildings to make the new kinds of goods—the TV sets, the air conditioning units, the new kinds of fabrics—thus stimulating spending on capital goods. Third, by developing new methods of making goods, thus reducing the life of existing capital and increasing the amount that it is advantageous to spend on replacements. In these several ways, technological research tends to raise spending for consumption, new investments, and replacements, and thus to bring about an expansion of spending."

Sumner H. Slichter in *The Atlantic Monthly*

NOTES from BATTELLE

IMPROVING TITANIUM WEAR

Titanium and titanium alloys have proved to be highly susceptible to galling, a type of wear in which there is a transfer of metal from one surface to another when rubbing takes place. Even lubricants cannot prevent such wear when titanium is involved. Investigation of the problem showed that the metal's wear resistance can be improved most effectively by creating a surface layer, which, in combination with lubricants, reduces the tendency to gall.

In an experimental program for the Watertown Arsenal, Battelle technologists H. A. Pray, Paul D. Miller, and Richard Jeffery studied methods of producing conversion coatings on titanium and its alloys. Conversion coatings are surface layers on metals, created through chemical or electrochemical reactions, which have chemical and physical properties different from the base metal. The task of the technologists was complicated because titanium's corrosion resistance made the finding of means for creating conversion coatings difficult.

The technologists evaluated several hundred solutions for producing conversion coatings by simple immersion as well as a number to produce coatings by electrochemical techniques. The evaluation was based upon the effectiveness of the resulting surface plus lubricant in preventing galling.

The two most effective immersion baths were found to be those containing 50 g/l of trisodium phosphate and 20 g/l of potassium fluoride, but differing amounts of hydrofluoric acid. The second of the baths, which is higher in hydrofluoric acid, is the more satisfactory because it operates at room temperature and produces a coating in one to two minutes.

Of the anodic coatings, the one produced from a sodium hydroxide bath is very good. The resulting coating is relatively thick and holds the lubricant well. Other anodic treatments produced fairly satisfactory coatings. If desirable, the coatings produced by both anodic and immersion methods can be removed easily in a regular nitric-hydrofluoric pickle bath. Coatings heat treated at 800 F for several hours have much greater wear resistance but are more difficult to remove.

The study indicated that the regular fluoride-phosphate and anodic coatings are useful in cold-forming operations. In addition, they have been shown to increase the adhesion of resins and lacquers to titanium surfaces. The heat-treated coatings are likely to be utilized in continuous-wear applications because of the marked increase in wear resistance produced.

FUEL ELEMENT RADIOGRAPHY

The feasibility of inspecting fabricated nuclear reactor fuel elements by means of gamma radiography has been demonstrated in a series of experiments conducted at Battelle for the AEC's Westinghouse-operated Bettis Laboratory.

Using a line radiation source of tungsten-185 wire five mils in diameter, a technique has been devised for obtaining gamma radiographs of the individual plates of an assembled parallel-plate fuel element. Each fuel element consists of a core of fuel alloy completely surrounded by cladding. Five of the tungsten wires are placed in an aluminum holder designed to fit the 50-mil-thick fuel element coolant channel. The holder is inserted in a coolant channel and X-ray film is placed in the adjacent channels, thus enabling inspection of two fuel plates at each 1.5-hour exposure. The radiographs reveal the thinning out of the core at the ends—called "core necking"—and the location of the edge of the fuel alloy core with respect to its cladding, as well as any defects in the core.

This novel radiographic technique was devised in order to permit the determination of the position of the core, of defects in the bonding of the core edge to the cladding, and, if possible, of core end thickening and necking in a multiplate assembly. Conventional radiography held little probability of providing adequate sensitivity when the pictures had to be taken through a number of plates formed as a unit.

Initial theoretical studies indicated that isotopes of thulium and tungsten would be the most promising sources for fine-line gamma radiography. Experiments showed that thulium was an excellent source except for the nonuniformity of radiation caused by uneven wire fabrication. Until a technology of thulium wire fabrication is developed, use of thulium as a line source will not be practical. Five-mil-diameter tungsten wire was available commercially and proved to be the most practical radiation source even though its gamma

radiation energy characteristics were not quite as suitable as those of the thulium isotope. The tungsten source requires a very high thermal neutron flux for sufficient activation and its gamma ray photons have higher than optimum energy for this particular task.

These research findings were reported by Meyer Pobereskin at the Symposium on Nondestructive Tests Developed in the Field of Nuclear Energy, in Chicago, April 18. The experimentation is fully described in the paper, "A Technique for Gamma Radiographic Inspection of Parallel-Plate Fuel Assemblies", written by Battelle technologists G. D. Calkins, M. Pobereskin, R. B. Price, and N. M. Ewbank, Jr.

CASTING STUDY TECHNIQUES

The increasing demand for high-quality castings has led the American Foundrymens Society to sponsor an extensive study of the principles of gating design at Battelle. The previous investigations, which have been continuing since 1947, developed the gating principles for producing clean castings. The work recently reached a point where further data on the solidification of castings appeared to be needed. The Research Committee of the Light Metals Division of AFS, which directed the gating study, decided that the thermal dynamics of castings as they are affected by the gating system should be studied so that the principles for locating gates to produce sound castings can be derived.

The first step for Battelle technologists J. G. Kura and W. H. Johnson, who guided the investigation, was the development of a suitable research technique. They sought a technique that would reveal the complete history of the solidification of a casting. Indirect methods, utilizing several materials other than metals, were evaluated. These materials included: freezing water; thymol; carbon tetrabromide; and diphenyl naphthalene. For various reasons, the indirect methods were unsatisfactory.

They then turned to direct methods, using actual metal castings. Experiments with radiographic techniques, radioisotopes, bleeding tests, and infrared motion pictures showed these methods to be unsatisfactory. However, an adaptation of the Naval Research Laboratory's technique of studying metal castings with thermocouples was made to provide fairly accurate data. By placing thermocouples in the mold cavity at various locations, it was found possible to record the progress of solidification as it actually occurs in castings of any shape. From the cooling curves of the various portions of the castings, it was possible to prepare drawings showing the progress of solidification during any given time interval. When used in conjunction with radiography for establishing shrink areas in solidified castings, the thermocouple technique appears to be ideally suited for studying the principles of thermal dynamics of casting.

MINIATURE RADIOGRAPHY

X-rays coupled with photographic enlargement of the radiograph are proving to be an efficient tool in reliability engineering research on miniature electronic components at Battelle.

Institute technologists find that the technique, which is used as a preliminary check on the cause of component failure, yields useful information concerning failure in about 75 per cent of the cases. Components examined are in the neighborhood of .25 inch long. The photographic enlargements are about 2.5 inches long, a 10 diameter enlargement.

Among the electronic components suitable for inspection by this method are diodes, transistors, capacitors, silicon rectifiers, photo-diodes, and possibly some resistors. The radiographs will show such types of failure as: burned out leads, displaced capacitor elements, reworked leads, and separations of many kinds.

Battelle technologists K. E. Hassler, J. E. Drennan, and Hall Cary point out that in addition to being a relatively inexpensive and rapid method of checking component failures, radiographic inspection is nondestructive and can be conducted on components prior to load life testing and then correlated with failures occurring during such experimentation.

When devices as small and fragile as many of the miniature electronic parts must be opened for visual inspection after failure, the reliability engineer runs considerable risk of destroying in the opening process the very evidence he is seeking. By changing his experimental procedure to utilize radiography he can reduce this problem.

Potentially this technique can be used with any inspection operation in which the parts are small and inaccessible.

Merle Rhoten, who heads Battelle's radiographic laboratory, describes the X-ray process as one that employs essentially standard procedures. But for best resolution, he says, one should use a small focal spot tube and a focal spot-to-object distance of at least 72 inches. This tends to collimate the X-ray beam so that after passing through the object it will produce as small a penumbral shadow as possible. In addition,

he suggests the use of high contrast, fine grain film, since it is from this film that the enlarged photographic prints will be made. Rhoten says that through use of extremely fine grain, high contrast film, magnifications of up to 50 diameters have been obtained.

* TELLURIUM SEMICONDUCTORS

A better understanding of tellurium-base semiconducting materials is being sought by technologists at Battelle. Studies there and in other laboratories suggest that such materials may find use in electronic devices such as rectifiers, solar batteries, and in electronic refrigeration.

In the Battelle studies, tellurium compounds of bismuth, antimony, arsenic, silver, copper, magnesium, cadmium, and indium are under scrutiny. The studies are under the sponsorship of the Tellurium Development Committee and seek to discover means of achieving high-purity compounds and to establish more precisely the physical, chemical, and electrical characteristics of such highly purified compounds.

Particularly interesting, according to Battelle technologists H. L. Goering and T. C. Harman, is the cooling effect exhibited when an electric current is passed through a specially prepared element of bismuth telluride.. Theoretically, they point out, bismuth telluride has a cooling capacity great enough, if a number of these elements are used together, to liquify air directly without resorting to compression. The full impact of the applications to refrigeration suggested by this cooling characteristic has not yet been fully realized.

Comprising the Tellurium Development Committee are representatives of Kennecott Copper Corporation; The Anaconda Company; U. S. Smelting, Refining & Mining Company; Phelps Dodge Refining Corporation; Noranda Mines, Limited; The American Metal Company, Limited; and Cerro de Pasco Corporation.

* METAL-CUTTING STUDY

The importance of machining or metal-cutting operations in the United States can be measured partially by the approximately 15 million tons of chips produced each year. These operations are so basic to industry that their cost affects the prices of most products. Aware of the economic importance of metal cutting, the Research Fund Committee of the American Society of Tool Engineers has planned a broad research program directed at various problems in the field.

A study now under way at Battelle, an initial step in the program, is concerned with evaluating published information on metal cutting. According to Battelle's F. W. Boulger, the objectives sought in the survey include:

- Translating technical information into language understandable by shop people so that they may utilize the data to improve their operations.
- Improving methods of reporting results of studies on metal cutting.
- Judging the extent of agreement between results obtained by different types of experiments.
- Pointing out variables in materials and processes which seem most important in particular operations.
- Providing a background for additional experimental research in the field of metal cutting.

Evaluating the material is a formidable task because of the large output (almost 500 articles a year) and because people from many fields write on the subject. The ASTE Metal-Cutting Steering Committee, which is guiding the effort, is agreed that the report resulting from the study should try to describe "why", rather than "what", events occur in machining operations.

* Construction is under way on a new office-laboratory building at Battelle's research center in Columbus, Ohio. In addition to the various office areas, the five-floor, 108,000 square-foot structure will house laboratories for extension of research in applied physics, mechanical engineering, and management services. A heat-pump installation, utilizing ground water, is also planned to heat and cool the building.

* Expanded facilities for research in physics, physical chemistry, mechanical engineering, electrical engineering, and metallurgy will be available at Battelle's Geneva laboratories with the completion of a new building. Hugo Thiemann, director of the Geneva center, anticipates that the building will be ready for occupancy in early 1958. The 187 by 54-foot structure will provide some 80 module units as well as areas for pilot-plant operations and materials evaluation in its 40,000 sq ft of laboratory space on four floors.

Writings by STAFF Members

Journal of Metals, v. 9; Sec. 2, *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, April, 1957 contains the following articles by staff members:

High-Strength Zirconium Alloy: Zr-4 Wt. Pct. Sn-1.6 Wt. Pct. Mo. W. Chubb, pp. 461-468.

This alloy is readily rolled at 800 C and has more than four times the creep strength of pure Zr at 500 C. Tensile strength of the alloy in the annealed condition is about 90,000 psi., and it may be heat-treated to a strength of more than 140,000 psi. It is harder in the air-quenched condition than as water-quenched.

Some Properties of Certain High-Conductivity Copper-Base Alloys. Webster Hodge, pp. 408-412.

Properties of a Zr-Cu alloy were determined and compared with those of Ag-bearing Cu and Cr-Cu alloys that are used to make commutator segments. A Zr-Cu material containing 0.18 per cent or more Zr was found superior for commutator manufacture.

Effect of Small Amounts of Alloying Elements on the Ductility of Cast Molybdenum. L. E. Olds and G. W. P. Rengstorff, pp. 468-471.

The most effective addition for lowering the bend angle transition temperature of cast Mo containing limited amounts of oxygen and nitrogen was Ti in amounts of 0.5 to one per cent. Other additions in the order of their decreasing effectiveness were ten per cent Th, 0.026 per cent Al, 0.1 per cent Ce, 0.5 per cent V, and less than 0.25 per cent Zr.

New Approach Cuts Work in Epicyclic Gear Train Calculations. R. M. Conklin and James Ballmer. *Product Engineering*, April, 1957, pp. 186-187.

Step-by-step computations for epicyclic gear trains give forces and speeds without using hard-to-remember formulas, for compound as well as simple trains.

Electropolishing. Charles L. Faust. Paper from *Metal Finishing Guidebook-Directory*. 25th Edition, Finishing Publications, pp. 442-452.

Presents a comprehensive discussion of the advantages and limitations of electropolishing, including commercial methods, properties of the metals, equipment, and costs. Surface finish measurements on steels, brass, and Al are reported.

Members of the Battelle staff are authors of the recently published articles and books listed on this page. In most cases, reprints are available from the Battelle Publications Office, 505 King Avenue, Columbus 1, Ohio.

Protective Metallic Coatings. Charles L. Faust. American Society for Metals, Cleveland. 40 pp. 1957.

Metallic coatings can be used for providing high-temperature surface protection of metals which have the necessary bulk properties of a metal vary according to the method of applying it as a coating and according to the physical and mechanical state of the basis metal to be coated. Properties of the composite structure, bulk-basis-metal + different-metal-surface, will depend on the formation of a diffusion alloy zone and on the properties of such a zone between the coating and the basis metal.

Heat Treatment of Titanium. P. D. Frost. *Metal Treating*, March-April, 1957, p. 6 + six pages.

Current knowledge concerning methods of improving properties through solution and aging heat treatments, avoiding embrittlement by the omega phase after heating, avoiding loss of ductility due to overheating, and preventing contamination and distortion during heat treatment is summarized.

From Cabul to Cobalt. A Historical View of the "Mischievous Metal". F. R. Morral. *Journal of Chemical Education*, April, 1957, pp. 185-186.

Tracing the history of cobalt reveals the fact that in chemical compounds it has played an important part in man's civilization since antiquity. It has been used as an industrial metal for only some 50 years.

Preparation, Properties, and Cladding of Aluminum-Uranium Alloys. H. A. Saller. *Progress in Nuclear Energy. Series V. Metallurgy and Fuels.* v. I. Pergamon Press, Ltd., 1956. pp. 535-543 + two plates.

The Al-U alloy system represents a very useful method of incorporating fuel into an alloy that is easy to fabricate, and reasonably strong. Cladding these alloys with Al by the "picture-frame" technique produces a fuel element with good corrosion resistance in water. For most applications, ordinary melting and casting followed by hot fabrication are adequate.

Design of Gray Iron Castings. Arthur Scharf and Charles F. Walton. *Foundry*, April, 1957, pp. 111-115.

Gives design tips which take into consideration costs, casting tolerances, and molding procedures best suited for parts of various types. Very often a slight change in size or shape of a part will make the foundry's job easier without materially affecting the utility of the casting.

Vapor Pressure and Derived Information of the Sodium Fluoride-Zirconium Fluoride System. Description of a Method for the Determination of Molecular Complexes Present in the Vapor Phase. Karl A. Sense, C. A. Alexander, R. E. Bowman, and R. B. Filbert, Jr. *Journal of Physical Chemistry*, March, 1957, pp. 337-344.

Vapor pressures over the range 599-1075 C were measured using the transpiration method. In addition to NaF and ZrF_4, a compound with the simple structure $NaZrF_5$ is indicated in the vapor phase. A phase diagram of the NaF-ZrF_4 system and an activity plot of the system NaF-$NaZrF_5$ suggest the existence of Na_3ZrF_7 in the liquid state.

WORLD-WIDE ABSTRACTS

in the FIELDS of

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424a Space Heating and Conditioning
424a Textiles, Fibers, Leather, and Paper
426a Welding and Joining
427a Miscellaneous

BATTELLE Technical Review ABSTRACTS

June 1957 Volume 6, Number 6

***Asterisks mark items that may be used in the Battelle Library only. None of the unbound materials listed below are available for interlibrary loan.**

AERONAUTICAL ENGINEERING

7864 (French.) Modern Theory Concerning the Soundproofing of Aircraft Cabins. **Doctrine actuelle d'insonorisation des cabines d'avion.** M. Kobrynski. *Acustica*, v. 6, no. 5, 1956, p. 393-402.

Shows the importance of reducing the noise of propulsion in aircraft cabins which is ascribed to the directional characteristics of the radiated sound.

7865 Aeronautical Engineering Catalog. Beverly A. Dodge, editor. 13th Ed. 358 p. 1957. Institute of the Aeronautical Sciences, New York. (T13 Ai78a Over.)

Includes a list of principal manufacturers and sources of supply, a file of company catalogs, and a directory of airborne products and their manufacturers.

7866 Elevated Temperature Requirements for a New Air-Borne Flight Analyzer. Christian J. Van Der Mass. *Aeronautical Engineering Review*, v. 16, Mar. 1957, p. 37-41.

A discussion of the need for an instrument making possible the collection of operational time histories of the accelerations, static pressure, total head pressure, and stagnation temperature of high-speed aircraft.

7867 Problems in Estimating Structure Weights. Mervyn G. Heal. *Aeronautical Engineering Review*, v. 16, Mar. 1957, p. 52-56.

Some procedures that can help achieve greater accuracy in estimating weights of high-speed airplanes and, in particular, low aspect ratio wings.

7868 An Analytical Method of Evaluating Thermal Stresses in Gas-Turbine Blades. William B. Sanders, Jr. and E. A. Trabant. *Aeronautical Engineering Review*, v. 16, Apr. 1957, p. 52-54.

7869* An Approximate Method for the Calculation of Turbulent Boundary Layers in Diffusers. J. F. Norbury. *Aeronautical Quarterly*, v. 8, Feb. 1957, p. 58-77.

7870 (Italian.) Effects of Jet Deviation on Some Basic Flying Characteristics of Jet Propelled Airplanes. **Influenza della deviazione del getto di uscita dei reattori su alcune caratteristiche di volo fondamentali degli aeroplani con propulsione a getto.** Gaspare Santangelo. *Aerotecnica*, v. 36, Dec. 1956, p. 395-401.

A study of the effect, for normal-design aircraft, of jet deviation in take off, flight, and landing.

7871 The Physical and Chemical Fundamentals of Satellite Flight. II. Paul F. Winternitz. *Astronautics*, v. 3, Autumn-Winter, 1956, p. 65 + 5 pages.

Computation of circular and escape velocity, and period of revolution.

7872* The Numerical Determination of Transient Temperatures in Wings. E. Kosko. *Canadian Aeronautical Journal*, v. 3, Mar. 1957, p. 87-95.

A formulation in terms of finite differences is presented which yields numerical solutions which can easily be calculated to any desired accuracy.

7873 Rockair—A Promising New Tool for Specialized High Altitude Research. Malcolm D. Ross and John E. Masterson. *Jet Propulsion*, v. 27, Mar. 1957, p. 276-278.

The nose cone of a standard 2.75-in. folding fin aircraft rocket was instrumented to detect cosmic ray radiation and to telemeter this information as a qualitative measurement of flight time and altitude.

7874 Leading Edge Cooling. Artur Mager. *Jet Propulsion*, v. 27, Mar. 1957, p. 293-295.

Gives expressions for the time required to reach any specific cylindrical leading edge temperature.

7875 Inviscid Hypersonic Flow Over Blunt-Nosed Slender Bodies. Lester Lees and Toshi Kubota. *Journal of the Aeronautical Sciences*, v. 24, Mar. 1957, p. 195-202.

7876 Dynamics of a Spinning Rocket With Varying Inertia and Applied Moment. Kenneth Jarmolow. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 308-313.

Analysis is performed through direct application of Euler's equations. The resulting motion is compared to that of a body of fixed moments of inertia caused by a torque of fixed magnitude.

7877 1957 Research Rocket Roundup. *Missiles and Rockets*, v. 3, Mar. 1957, p. 39-48.

History and specifications of current upper air and lunar research rockets.

7878* (English.) **Level Flights With Expansible Balloons.** J. E. Laby, Y. K. Lim, and V. D. Hopper. *Nuovo Cimento*, v. 5, ser. 10, Jan. 1957, p. 249-259.

Single rubber or neoprene balloons were used to obtain level flights at altitudes in the region 80,000 to 105,000 ft. to expose nuclear emulsion plates to cosmic radiation.

7879 Aerodynamics, Theory and Practice. T. Nonweiler. *Research*, v. 10, Feb. 1957, p. 48-56.

Lift and drag; theory of air flow; variation of air pressure; viscosity effects.

7880 Wings and Bodies in Low Speed Flow. J. L. Stollery. *Research*, v. 10, Mar. 1957, p. 87-96.

Flow around two-dimensional and three-dimensional wings; effects of sweep; flow around thin wings; interference effects and aerodynamic cleanness.

7881 Aerodynamic Forces on an Oscillating Aerofoil Fitted With a Spoiler. L. C. Woods. *Royal Society, Proceedings*, v. 239, ser. A, Mar. 12, 1957, p. 328-337.

A theoretical analysis of a thin aerofoil performing small harmonic oscillations in an incompressible fluid with flow separation from a prescribed point on the upper surface. On the whole it is found that a stalled or partially stalled areofoil has less aerodynamic damping than an unstalled aerofoil.

7882 The Use of Aluminium Honeycomb Sandwich Construction for Commercial and Aircraft Applications. G. S. Newell. *Sheet Metal Industries*, v. 34, Mar. 1957, p. 197-202.

7883* (French.) A Theoretical Study of the Annular Wing. **Étude théorique de l'aile annulaire.** M. G. Faure. *Technique et Science Aéronautiques*, v. 6, no. 6, 1956, p. 293-297.

Results are reported for incompressible subsonic flow.

7884 Wind-Tunnel and Flight Investigations of the Use of Leading-Edge Area Suction for the Purpose of Increasing the Maximum Life Coefficient of a 35° Swept-Wing Airplane. Curt A. Holzhauser and Richard S. Bray. *U. S. National Advisory Committee for Aeronautics, Report* 1276, 1956, 24 p. (TL521 Un3r Vis.)

Maximum lift coefficient was increased more than 50% by the use of area suction.

7885 Flight Determination of Drag of Normal-Shock Nose Inlets With Various Cowling Profiles at Mach Numbers From 0.9 to 1.5. R. I. Sears, C. F. Merlet, and L. W. Putland. *U. S. National Advisory Committee for Aeronautics, Report* 1281, 1956, 19 p. (TL521 Un3r Vis.)

7886 A Special Method for Finding Body Distortions That Reduce the Wave Drag of Wing and Body Combinations at Supersonic Speeds. Harvard Lomax and Max. A. Heaslet. *U. S. National Advisory Committee for Aeronautics, Report* 1282, 1956, 38 p. (TL521 Un3r Vis.)

Application is made to an elliptic wing having a biconvex section, a thickness-chord ratio equal to 0.05 at the root, and an aspect equal to 3.

7887 A Wind-Tunnel Investigation of 0.4-Scale Model of an Assault-Transport Airplane With Boundary-Layer Control Applied. Marvin P. Fink, Bennie W. Cocke, and Stanley Lipson. *U. S. National Advisory Committee for Aeronautics Research Memorandum* L55G26a, May 1956, 63 p. (TL782 Un3rm Vis.)

7888 Problem of Slip Flow in Aerodynamics. Robert E. Street. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* 57A30, Mar. 1957, 29 p. (TL782 Un3rm Vis.)

Survey of the present status of theory in the field of slip-flow aerodynamics leads to the conclusion that the Navier-Stokes equations of motion together with first-order velocity slip and temperature jump at any boundary are sufficient insofar as experimental confirmation is available.

7889 Wind-Tunnel Investigation of Effect of Propeller Slipstreams on Aerodynamic Characteristics of a Wing Equipped With a 50-Percent-Chord Sliding Flap and a 30-Percent-Chord Slotted Flap. Richard E. Kuhn and William C. Hayes, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3918, Feb. 1957, 72 p. (TL570 Un3t)

Data applicable to aircraft designed for vertical take-off and landing.

7890 A Theoretical and Experimental Study of Planing Surfaces Including Effects of Cross Section and Plan Form. Charles L. Shuford, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3939, Mar. 1957, 126 p. (TL570 Un3t)

Principal planing characteristics for models having sharp chines were obtained for a rectangular flat and two V-bottom surfaces having constant angles of dead rise of 20 and 40°.

7891 The Erosion of Meteors and High-Speed Vehicles in the Upper Atmosphere. C. Frederick Hansen. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3962, Mar. 1957, 38 p. (TL570 Un3t)

Analytic relations for velocity, deceleration, size, and relative luminous magnitude of meteors are derived and expressed in dimensionless parametric form.

7892* (English.) **Expansion Procedures and Similarity Laws for Transonic Flow. I. Slender Bodies at Zero Incidence.** Julian D. Cole and Arthur F. Messiter. *Zeitschrift für Angewandte Mathematik und Physik*, v. 8, Jan. 25, 1957, p. 1-25.

Detailed and comprehensive account of a transonic approximation as applied to flows past wings and bodies.

7893* (English.) **On the Motion of a Projectile in the Atmosphere.** Vi-Cheng Liu. *Zeitschrift für Angewandte Mathematik und Physik*, v. 8, Jan. 25, 1957, p. 76-82.

The velocity of a projectile can be expressed explicitly in terms of confluent hypergeometric functions.

See also: **8299** (coatings for missiles); **8448** (beacon for guided missiles); **8450** (timer for supersonic models); **8487** (growth of commercial air transportation); **8540** (combustibility hazards in aircraft); **8880** (steels for aircraft); **8884** (fatigue of aeronautical materials); **9122** (human engineering for aircraft).

AGRICULTURE

7894* 1956 Fungicide Tests. II. *Agricultural Chemicals*, v. 12, Mar. 1957, p. 69 + 2 pages.

Results of various spray programs on apple, pear, and peach trees. (To be continued.)

7895* Foliage Fungicides and Combination Sprays. Robert H. Daines. *Agricultural Chemicals*, v. 12, Apr. 1957, p. 32 + 5 pages.

Although considered inert, fillers frequently influence materially the fungitoxic or phytotoxic properties of fungicide mixtures. Inactivation of Streptomycin by certain clays through absorption is cited as an example.

7896* Crop Production Without Soil. R. H. Stoughton. *Agricultural Review*, v. 2, Mar. 1957, p. 29-35.

Techniques involved; comparison with conventional culture in soil.

7897* Effect of Various Sources of Nitrogen on Rice Paddy Yield. A. Wahhab and H. M. Bhatti. *Agronomy Journal*, v. 49, Mar. 1957, p. 114-116.

Relative efficiency of $(NH_4)_2SO_4$, NH_4NO_3, KNO_3, $CaCN_2$, and urea as sources of N were studied. Generally, $(NH_4)_2SO_4$ was most effective.

7898* Response of Alfalfa Varieties to Temperatures and Daylengths. M. H. Schonhorst, R. L. Davis, and A. S. Carter. *Agronomy Journal*, v. 49, Mar. 1957, p. 142-143.

Ten varieties and a mixture of alfalfa were grown at 60, 70, and 80 F at 8-, 12-, and 16-hr. daylengths for each temperature. Growth responses showed the greatest height differences at 60 F and a 12-hr. daylength.

7899* Growth and Growth Hormones in Plants. Kenneth V. Thimann. *American Journal of Botany*, v. 44, Jan. 1957, p. 49-55.

A general summary of present knowledge of the auxins and their physiology.

7900* The Effect of Mineral Nutrition on the Content of Free Amino Acids and Amides in Tomato Plants. II. A Study of the Effect of Molybdenum Nutrition. J. V. Possingham. *Australian Journal of Biological Sciences*, v. 10, Feb. 1957, p. 40-49.

Large increases in the concentration of aspartic acid, glutamic acid, glycine, glutamine, and asparagine occurred initially with Mo treatment, but were followed by steady declines. Both β-alanine and γ-aminobutyric acid decreased in concentration soon after Mo was applied.

7901* Chlorine and Bromine in the Nutrition of Higher Plants. P. G. Ozanne, J. T. Woolley, and T. C. Broyer. *Australian Journal of Biological Sciences*, v. 10, Feb. 1957, p. 66-79 + 1 plate.

Leaf and top yields of tomato and clover were reduced by over 80% when insufficient Cl was supplied. Bromine does not appear to completely substitute for Cl in growth and development of plants, as evidenced by weight and wilt differences.

7902* (English.) **Investigations on Organic Fungicides. XI. The Role of Metals and Chelating Agents in the Fungitoxic Action of Sodium Dimethyldithiocarbamate (NaDDC).** A. Kaars Sijpesteijn, M. J. Janssen, and G. J. M. van der Kerk. *Biochimica et Biophysica Acta*, v. 23, Mar. 1957, p. 550-557.

7903* Deterioration of Stored Grains by Fungi. Clyde M. Christensen. *Botanical Review*, v. 23, Feb. 1957, p. 108-134.

The fungi involved; their occurrence, effects, and control.

7904 The Preparation and Plant Physiological Activity of 1,3-Benzodioxole-2-Carboxylic Acids. P. W. Zimmerman, William Richard Smith, Edward A. Prill, and A. E. Hitchcock. *Boyce Thompson Institute, Contributions*, v. 18, Jan.-Mar. 1957, p. 453-462.

When applied to tomato plants, BCA and its 4,6-dichloro-substituted derivative caused epinasty of leaves, curvature of stems, proliferation of stem tissue, modification of leaves, parthenocarpy, formation of adventitious roots, and stunting or killing with the higher concentrations.

7905 Biosynthesis of Quercetin in Buckwheat. I-II. E. W. Underhill, J. E. Watkin, and A. C. Neish. *Canadian Journal of Biochemistry and Physiology*, v. 35, Mar. 1957, p. 219-237.

7906* A Percolation Method for Measuring Potassium-Supplying Power of Soils. B. C. Matthews and J. A. Smith. *Canadian Journal of Soil Science*, v. 37, Feb. 1957, p. 21-28.

Apparatus for continuous circulation of water through a soil sample and a cation exchange resin permits ready evaluation of soils.

7907* (German.) Importance of Magnesia Fertilization. **Die Bedeutung der Magnesiadüngung.** L. Seidler. *Chemiker-Zeitung*, v. 81, Feb. 20, 1957, p. 106-110.

Observation of deficiencies in plants as a consequence of lack of magnesia shows the necessity of extending soil analysis to this substance. Fertilizers which are both rapidly effective and difficult to dissolve are available.

7908* (Russian.) The Way Dioecious Plants Answer to the Application of the 2,4-D Herbicide. **Reaktsiia dvudomnykh rastenii na gerbitsid 2,4-D.** A. V. Voevodin. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 148-151.

When using 2,4-D with dioecious perennial plants during a two-year experiment, some cases of sex conversion from male to female and vice-versa were observed.

7909* Residue Tolerances for Dow Agricultural Chemicals. G. E. Lynn. *Down to Earth*, v. 12, Spring 1957, p. 9-11.

A list of active ingredients and residual tolerances of numerous fumigants, herbicides, and insecticides.

7910* Dowpon for Grass Control in Seedling Legumes. R. A. Peters and A. J. Kerkin. *Down to Earth*, v. 12, Spring 1957, p. 14-15.

Dowpon has given excellent control of foxtail and crabgrass in early post-emergence applications on alfalfa and birdsfoot trefoil. The tolerance of orchard grass and timothy was greater than that of foxtail and crabgrass.

7911* The Effect of Rate and Time of Application of Nitrogen on the Yield of Winter Wheat. G. A. Blackett. *Empire Journal of Experimental Agriculture*, v. 25, Jan. 1957, p. 19-23.

7912* The Value of Seaweeds in Animal Feedingstuffs as a Source of Minerals, Trace Elements, and Vitamins. W. A. P. Black and F. N. Woodward. *Empire Journal of Experimental Agriculture*, v. 25, Jan. 1957, p. 51-59.

In general, seaweeds are a good source of the vitamins A, C, D, E, and K, and fed at the 10% level should provide the requirements of most livestock, but will contribute only small amounts of the other vitamins. As a mineral supplement, seaweeds are capable of providing only NaCl and I in sufficient amounts to meet the animal's requirements.

7913 Spanish Moss and Some Aspects of Its Commercial Possibilities. Robert B. Bennett. *Florida Engineering and Industrial Experiment Station, Technical Progress Report*, v. 8, Dec. 1954, 11 p. (TA1 F66e Contin.)

Improvements in processing methods might make further research more profitable. Pilot plant processes for wax extraction and fiber production are summarized.

7914 Genetics in Plant Breeding. 236 p. 1956. Brookhaven National Laboratory, Upton, New York. (SB123 Un3.1g)

A symposium dealing with the utilization of changes in the chromosomal complement, studies in quantitative inheritance, self-incompatibility and male sterility, character association analysis, radiation-induced mutations, and natural and induced variability.

7915 Mode of Action of Insecticides, Metabolism and Selectivity of O,O-Dimethyl 2,2,2-Trichloro-1-Hydroxyethyl Phosphonate and Its Acetyl and Vinyl Derivatives. B. W. Arthur and J. E. Casida. *Journal of Agricultural and Food Chemistry*, v. 5, Mar. 1957, p. 186-192.

7916 Tobacco Aging, Enzymes of Bright and Burley Tobaccos. Robert E. Barrett. *Journal of Agricultural and Food Chemistry*, v. 5, Mar. 1957, p. 220-224.

Using manometric, colorimetric, titrimetric, and viscometric techniques, marked differences in enzyme activity were shown between unaged flue-cured tobacco (bright) and unaged air-cured tobacco (burley). Aging of bright tobacco involves primarily chemical effects and aging of burley tobacco possibly involves both chemical effects and enzymes.

7917* Field Evaluation of Oriental Fruit Fly Insecticides in Hawaii. Loren F. Steiner. *Journal of Economic Entomology*, v. 50, Feb. 1957, p. 16-24.

The protein hydrolysate-parathion or -malathion bait sprays and methyl eugenol-pyrolan bait stations are recommended for use in any large-scale control or eradication campaign.

7918* The Effects of Temperature and Stage of Life Cycle Upon the Toxicity and Metabolism of DDT in the House Fly. J. J. Menn, E. Benjamini, and W. M. Hoskins. *Journal of Economic Entomology*, v. 50, Feb. 1957, p. 67-74.

7919* Transpiration From Wilting Leaves. W. T. Williams and F. A. Amer. *Journal of Experimental Botany*, v. 8, Feb. 1957, p. 1-19.

Hygen's postulate is invalid for *Pelargonium*, since the whole course of a 12-hr. Hygen curve lies within the constant-rate phase, during which transpiration is independent of water-content. A similar situation is likely in other leaves, but Hygen's analysis, representing a linear falling-rate phase of drying, may be needed for more hygrophytic leaves.

7920* The Selective Uptake of Alkali Cations by Red Beet Root Tissue. J. F. Sutcliffe. *Journal of Experimental Botany*, v. 8, Feb. 1957, p. 36-49.

When disks of root tissue are transferred from distilled water to a solution of salts, there is a rapid initial uptake of cations which is neither particularly selective, nor directly related to metabolism. The prolonged active accumulation of cations exhibits strong selectivity, Na being preferred to other ions.

7921* Problems of Managing Upper Michigan's Coniferous Swamps. Philip L. Thornton. *Journal of Forestry*, v. 55, Mar. 1957, p. 192-197.

7922* Mechanized Thinning in Jack Pine Saplings. R. C. Dosen, J. H. Stoeckeler, and F. G. Kilp. *Journal of Forestry*, v. 55, Mar. 1957, p. 201-204.

Large-scale mechanical thinning resulted in a 50 to 60% cost reduction as compared with hand thinning.

7923 Absorption and Metabolism of BHC in Susceptible and Resistant Houseflies. F. R. Bradbury. *Journal of the Science of Food and Agriculture*, v. 8, Feb. 1957, p. 90-96.

Measurement of the capacity of a number of susceptible insect species to metabolize benzene hexachloride isomers shows that the susceptible strain of housefly exhibits exceptional ability to eliminate γ-BHC as water-soluble products.

7924* Non-Symbiotic Nitrogen-Fixing Bacteria in Soil. III. Total Nitrogen Changes in a Field Soil. C. A. Parker. *Journal of Soil Science*, v. 8, Mar. 1957, p. 48-59.

The total N content of a field soil was increased when rye grass or medic was grown on it, and also when cane sugar was added. Both grass and medic yielded substantial amounts of N in top material in addition to the soil N gains.

7925* Isotopically Exchangeable Phosphorus in Soils. II. Factors Influencing the Estimation of 'Labile' Phosphorus. O. Talibudeen. *Journal of Soil Science*, v. 8, Mar. 1957, p. 86-96.

Influence of soil: solution ratio, orthophosphate ions added with radio-phosphorus, the equilibrium pH, and the removal of increasing amounts of phosphate from the soil.

7926* Antibiotics in Animal Nutrition. T. Jackson. *Manufacturing Chemist*, v. 28, Mar. 1957, p. 139 + 3 pages.

Effects of antibiotic feeds on poultry, swine, and ruminant animals; action of dietary antibiotics; effect on human nutrition.

7927* Some Factors Affecting Absorption and Transport of Foliar-Applied Nutrients as Revealed by Radioactive Isotopes. F. G. Teubner, S. H. Wittwer, W. G. Long, and H. B. Tukey. *Michigan State University, Agricultural Experiment Station, Quarterly Bulletin*, v. 39, Feb. 1957, p. 398-415.

Absorption of nutrients by leaves is generally greater during daylight hours or if plants are exposed to light. Added sucrose reduces absorption, but enhances nutrient transport from leaves if plants are low in sugar. Surface-active agents applied to leaves reduced adherence and markedly depressed phosphate absorption.

7928* Further Observations on Irrigating Trees With Cannery Waste Water. Victor J. Rudolph. *Michigan State University, Agricultural Experiment Station, Quarterly Bulletin*, v. 39, Feb. 1957, p. 416-423.

Newly planted stands of boxelder, black willow, hybrid willow, cottonwood and balsam poplar were irrigated. Except for the cottonwood, survival was higher in the irrigated plantings than in the check area.

7929* The Evaluation of Insecticides for Control of the European Pine Shoot Moth Under Spring and Summer Conditions. Gordon Guyer, W. F. Morofsky, and W. Lemmien. *Michigan State University, Agricultural Experiment Station, Quarterly Bulletin*, v. 39, Feb. 1957, p. 432-437.

DDT was the most effective of the materials evaluated.

7930* Elimination of Potato Virus Y From a Potato Variety. A. D. Thomson. *New Zealand Journal of Science and Technology*, v. 38, sec. A, Feb. 1957, p. 482-490.

The establishment of shoot apices in culture and their subsequent transfer to incubators kept at 35 C for up to two weeks appears to be the most satisfactory method for eliminating virus Y.

7931* Eradicant Treatments for Narcissus Bulbs and Gladiolus Corms Harboring Soybean Nematode Cysts. N. N. Winstead and C. B. Skotland. *Phytopathology*, v. 47, Feb. 1957, p. 67-69.

Soak treatments with sodium 2,4,5-trichlorophenoxide at a concentration of 3 lb. of an 85% formulation to 100 gal. of water for 15 min. or 2 lb. to 100 gal. of water for 1 to 2 hrs. was lethal.

7932* Field and Laboratory Tests of Seed Protectants for Canning Peas. D. J. Hagedorn. *Phytopathology*, v. 47, Feb. 1957, p. 70-72.

Tests in greenhouse temperature tanks, in a walk-in cold chamber, and in rolled towels compared favorably with field tests.

7933 Plant Growth Substances. Frank B. Salisbury. *Scientific American*, v. 196, Apr. 1957, p. 125 + 7 pages.

Discovery of new growth stimulators has opened up new horizons in plant physiology and agriculture.

7934 Insecticidal Performance of Strobane Aerosols. John C. McCool. *Soap and Chemical Specialties*, v. 33, Mar. 1957, p. 91 + 4 pages.

Particle size and formulations determine insecticidal power of aerosols. Valve geometry also is a factor. Optimum particle size distribution of Strobane aerosols is characterized by a median mass diameter of about 17μ.

7935 Insect Attractants and Repellents. II. Attractants. V. G. Dethier. *Soap and Chemical Specialties*, v. 33, Mar. 1957, p. 97 + 1 page.

Attractants are employed principally to bait traps. Two categories of agents which are true attractants are: the products of the female sex scent glands and the unknown materials of interactions by which some insects enhance the attractiveness of food upon which they have fed.

7936* Spectrochemical Methods in Soil Investigations. R. L. Mitchell. *Soil Science*, v. 83, Jan. 1957, p. 1-13.

The applicability of various spectrochemical methods for different types of soil analysis.

7937* An Emission Spectrochemical Analytical System as a Tool in Plant-Nutrition and Soil Investigations. Alston W. Specht, E. James Koch, and John W. Resnicky. *Soil Science*, v. 83, Jan. 1957, p. 15-32.

Analytical system employing a d.c. arc and a total spectral energy procedure is relatively fast and simple.

7938* Techniques and Applications of Spectroscopy in Plant Nutrition Studies. A. P. Vanselow and G. R. Bradford. *Soil Science*, v. 83, Jan. 1957, p. 75-83.

7939 (Dutch.) The Resistance of Insects to Insecticides. **Resistentie van insekten tegen bestrijdingsmiddelen.** C. J. Briejèr. *T.N.O.-Nieuws*, v. 12, Feb. 1957, p. 55-59.

A study of insecticides such as D.D.T. and parathion. Physiological and morphological resistance, and resistance by development of a special behavior. Practical suggestions.

7940* (Spanish.) Controlling the Fall Army Worm (*Laphigma frugiperda*, Smith and Abbott), a Corn Insect, by Means of Insecticides in Nicaragua. **Combate del gusano cogollero del maíz (*Laphigma frugiperda* S. and A.) por medio de insecticidas en Nicaragua.** Francisco A. Estrada. *Turrialba*, v. 6, July-Sept. 1956, p. 53-58.

Methyl parathion proved most effective because of its rapid action; its application is recommended for areas of frequent rains; DDT and dieldrin have a slower action but a longer residual effect and can be used under dry weather conditions.

7941 Radioactive Isotopes in Agriculture. *U. S. Atomic Energy Commission*, TID 7512, Jan. 1956, 416 p. (UF767 Un3ti Contin.)

A collection of papers presented at the Conference on Radioactive Isotopes in Agriculture held at the Michigan State University on Jan. 12, 13, and 14, 1956. Topics covered include radiobiological studies, wastes, plant nutrition, pesticides, and food preservation.

See also: **8069** (lipoxydase activity of grain); **8114** (bromothiazolylamines pesticides); **8568** (prediction of freezing conditions); **9344** (pesticides for moths and carpet beetles).

BIOCHEMISTRY AND BIOPHYSICS

7942 The Optical Rotatory Dispersion of Polypeptides and Proteins in Relation to Configuration. Jen Tsi Yang and Paul Doty. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 761-775.

7943 The Hydration of the Annular Nitrogen Group as a Factor in the Combination of Hapten With Antibody. David Pressman and Malcolm Siegel. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 994-1000.

Suggests that water of hydration may be a structural feature of significance in biological systems in general.

7944 Mechanisms of Enzyme-Catalyzed Oxidation-Reduction Reactions. I. An Investigation of the Yeast Alcohol Dehydrogenase Reaction by Means of the Isotope Rate Effect. H. R. Mahler and Joyce Douglas. *American Chemical Society, Journal,* v. 79, Mar. 5, 1957, p. 1159-1166.

The kinetics of the reversible dehydrogenation of ethanol by diphosphopyridine nucleotide, catalyzed by the alcohol dehydrogenase from yeast, were examined in dilute phosphate buffer of *p*H 7.6.

7945 The Preparation and Bacteriostatic Activity of Substituted Ureas. David J. Beaver, Daniel P. Roman, and Paul J. Stoffel. *American Chemical Society, Journal,* v. 79, Mar. 5, 1957, p. 1236-1245.

Preparation and *in vitro* bacteriostatic activity of some ureas, carbanilides and related compounds against *Micrococcus pyogenes* var. *aureus*. Physical data of the compounds. Relation of antimicrobial action to structure.

7946 Chemical Effects of Ionizing Radiation on Proteins. I. Effect of γ-Radiation on the Amino Acid Content of Insulin. Maurice P. Drake, J. Walter Giffee, Dorothy A. Johnson, and Virgil L. Koenig. *American Chemical Society, Journal,* v. 79, Mar. 20, 1957, p. 1395-1401.

One per cent insulin in basic (*p*H 8.5) and in acidic (*p*H 3.0) solutions was subjected to 0, 10, 20, and 40 million r.e.p. γ-radiation doses.

7947 Allergenicity of Tranquilizing Drugs. Clarence Bernstein and Solomon D. Klotz. *American Medical Association, Journal,* v. 163, Mar. 1957, p. 930-933.

Some observations on cases of sensitivity to reserpine, chlorpromazine, and meprobamate.

7948 Role of Tranquilizing Drugs in Allergy. Ben C. Eisenberg. *American Medical Association, Journal,* v. 163, Mar. 1957, p. 934-937.

Tranquilizing drugs were found to be of therapeutic value in allaying tension and anxiety states in patients suffering from various allergic conditions. Effects of chlorpromazine, reserpine, and meprobamate were studied.

7949* The Nature and Composition of Experimental Bacterial Aerosols. T. W. Kethley, W. B. Cown, and E. L. Fincher. *Applied Microbiology,* v. 5, Jan. 1957, p. 1-8.

Character of the aerosols is determined by the composition of the dispersion medium. Observed and calculated particle sizes were in good agreement when the calculations were made on the basis of the volume of the original atomized droplet, the concentration of solids of low vapor pressure liquids in the dispersion media, and their responses to relative humidity.

7950* Rate Behavior and Concentration Profiles in Geometrically Constrained Enzyme Systems. Jacob J. Blum and Donald J. Jenden. *Archives of Biochemistry and Biophysics,* v. 66, Feb. 1957, p. 316-332.

Rate behavior of cells or tissues of several geometrical shapes, for the case when the enzyme in the cell is consuming substrate according to the Michaelis-Menten rate law. Equations for computation of concentration profile.

7951 Semiannual Report to the Atomic Energy Commission. Leon O. Jacobson and Antreen Pfau. *Argonne Cancer Research Hospital (U. S. Atomic Energy Commission),* ACRH-6, Sept. 1956, 114 p. (UF767 Un3.1ac Contin.)

Fifteen papers on miscellaneous topics of interest in cancer research, including effects of radiation and various compounds on cell biology.

7952* The Chromatin Bodies of Bacteria. C. F. Robinow. *Bacteriological Reviews,* v. 20, Dec. 1956, p. 207-242.

Varieties of nuclear behavior in higher organisms and protists; cytological techniques and observations.

7953* The Calculation of Microbial Assays. C. I. Bliss. *Bacteriological Reviews,* v. 20, Dec. 1956, p. 243-258.

Basic experimental design; calculation from the standard curve; factorial analysis; calculating incomplete assays.

7954* The Stereoisomers of αε-Diaminopimelic Acid. II. Their Distribution in the Bacterial Order Actinomycetales and in Certain Eubacteriales. D. S. Hoare and Elizabeth Work. **III. Properties and Distribution of Diaminopimelic Acid Racemase, an Enzyme Causing Interconversion of the LL and *meso* Isomers.** Mani Antia, D. S. Hoare, and Elizabeth Work. *Biochemical Journal,* v. 65, Mar. 1957, p. 441-459.

7955* Ultraviolet Fluorescence of the Aromatic Amino Acids. F. W. J. Teale and G. Weber. *Biochemical Journal,* v. 65, Mar. 1957, p. 476-482.

The fluorescence-excitation spectrum, fluorescence spectrum, and quantum yield are proposed as criteria to characterize a molecular species in solution as a fluorescent entity.

7956* (English.) **Molecular Autoradiography: The β-Ray Counting From Single Virus Particles and DNA Molecules in Nuclear Emulsions.** Cyrus Levinthal and Charles A. Thomas, Jr. *Biochimica et Biophysica Acta,* v. 23, Mar. 1957, p. 453-465.

The radioactivity is measured by imbedding the particles in a sensitive nuclear emulsion.

7957* (English.) **A Study of the Effect of Ionizing Radiations on Lactoperoxidase.** H. B. Hamilton, S. Okada, and Martin Morrison. *Biochimica et Biophysica Acta,* v. 23, Mar. 1957, p. 540-543.

Study by means of spectra and enzyme activity after exposure to a Co^{60} γ-ray source.

7958* (English.) **Ultracentrifugal Analysis of Dilute Solutions.** V. N. Schumaker and H. K. Schachman. *Biochimica et Biophysica Acta,* v. 23, Mar. 1957, p. 628-639.

Visible and ultra-violet absorption optics were used in studies at concentrations of about 0.001%. Experimental techniques and methods of handling the photographic plates are described.

7959* Photosynthesis. S. Aronoff. *Botanical Review,* v. 23, Feb. 1957, p. 65-107.

Photochemical aspects; transfer of photochemical to biochemical energy; redox potentials and the Hill reaction; assimilation of CO_2; thermodynamics of the photosynthetic carbon cycle.

7960 The Design and Calibration of the Instrument Tunnel for Irradiations of Biological Material. H. J. Curtis and N. Delihas. *Brookhaven National Laboratory (U. S. Atomic Energy Commission),* BNL425(T-83), Dec. 1956, 6 p. (UF767 Un3.1bn Contin.)

A neutron irradiation facility designed for biological use has an exposure cavity approximately 18 x 7 x 6-in.

7961 An Antibiotic Similar to Xanthomycin A. D. K. Dougall. *Chemical Society, Journal,* Feb. 1957, p. 628-633.

A species of *Streptomyces* obtained from a sample of Malayan soil was shown to produce an antibiotic that is either identical with, or very similar to, xanthomycin A.

7962 Chlorophyll and Related Compounds. VI. The Synthesis of Octaethylchlorin. Ulli Eisner, Aleksandra Lichtarowicz, and R. P. Linstead. *Chemical Society, Journal,* Feb. 1957, p. 733-739.

A five-stage synthesis of 3:4-diethylpyrrole was developed. From it, octaethyl-chlorin and -porphin were prepared in good yield by way of the Mannich base.

7963 Synthesis of New Sugar Derivatives of Potential Antitumour Activity. I. Ethyleneimino- and 2-Chloroethylamino-Derivatives. L. Vargha, L. Toldy, Ö. Fehér, and S. Lendval. **II. Di-2-(Chloroethyl)*D*-Glucosamine Hydrochloride.** L. Vargha, Ö. Fehér, and S. Lendval. *Chemical Society, Journal,* Feb. 1957, p. 805-812.

7964 A Search for New Trypanocides. IV. Some Derivatives of 4-Amino-6-Aminomethylquinaldine and 1:2-Di-(4-Aminoquinald-6-yl) Ethylene. J. N. Ashley and M. Davis. *Chemical Society, Journal,* Feb. 1957, p. 812-819.

7965* (French.) The Free Amino Acids of Carrot Root and Their Evolution During Tissue Culture *in Vitro*. **Les acides aminés libres de la racine de carotte et leur évolution au cours de la culture des tissus *in vitro*.** Yves Menoret. *Comptes Rendus,* v. 244, Jan. 21, 1957, p. 488-489.

The distribution of the free amino acids varies according to the tissue. Parenchyma is the same for the same tissues and has a high alanine content.

7966* (French.) Observations on the Production of Ethylene by *Penicillium Digitatum*. **Observations sur la production d'éthylène par le penicillium digitatum.** Phan-Chon-Tôn. *Comptes Rendus*, v. 244, Feb. 25, 1957, p. 1243-1246.

Studies of the evolution of ethylene gas and the growth of mushrooms. Gas was emitted while the vegetal growth of the microorganism was most active.

7967* (Russian.) A Cytochemical Study of Ribonucleic Acid in Developing Eggs of Certain Invertebrates. **Tsitokhimicheskoe issledovanie ribonukleinovoi kisloty v razvivaiushchikhsia iaitsakh nekotorykh bespozvonochnykh.** I. I. Kiknadze. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 133-136 + 1 plate.

7968* The Growth Pattern of Human Cancer Cells in Tissue Culture With *Mycobacterium Tuberculosis*. Audrey Fjelde. *Experimental Cell Research*, v. 12, Feb. 1957, p. 35-43.

Effects ranged from toxic and depressed growth with heavy suspensions of organisms to a stimulated growth of tissue cells with survival of cells and bacilli.

7969* Circulatory Depression Induced by High Levels of Positive Pressure Breathing Counteracted by Metaraminol (Aramine). W. L. Morgan, Jr., J. T. Binion, and S. J. Sarnoff. *Journal of Applied Physiology*, v. 10, Jan. 1957, p. 26-30.

Aramine consistently ameliorated the hypotensive effects of positive pressure breathing in 17 anesthetized dogs for significant periods of time. It was effective when administered either intramuscularly or intravenously.

7970* Cerebral Metabolism of Isotopic Glucose in Normal Human Subjects. Williams Sacks. *Journal of Applied Physiology*, v. 10, Jan. 1957, p. 37-44.

7971* The Copper Complexes of Mono- and Diiodotyrosine, Thyronine, Di- and Triiodothyronine, and Thyroxine. Sidney Davis. *Journal of Biological Chemistry*, v. 224, Feb. 1957, p. 759-766.

Complexes are prepared in a mixture of butanol-propanol-water solution of Na_2CO_3. Empirical formula is CuA_2 at pH 9.3. A rapid, sensitive, accurate flame photometric method of analysis is described.

7972* Condensation of Proteins With Thiocyanate. Felix Haurowitz, Morris Zimmerman, Richard L. Hardin, Sarah G. Lisie, Jack Horowitz, Arthur Lietze, and Fahamet Bursa. *Journal of Biological Chemistry*, v. 224, Feb. 1957, p. 827-839.

Proteins and natural polypeptides were condensed with ammonium thiocyanate under conditions which lead to the formation of 2-thiohydantoins from amino acids.

7973* Studies on the Preparation of a Respiratory Cell-Free Extract of the Alga *Chlorella*. J. W. Millbank. *Journal of Experimental Botany*, v. 8, Feb. 1957, p. 96-104.

Drying the cells at 18-20 C *in vacuo* over P_2O_5 for 20 to 22 hr. was successful.

7974* Effect of Ultraviolet Light on Poliomyelitis Virus. A. R. Taylor, W. W. Kay, I. W. McLean, Jr., F. Oppenheimer, and F. D. Stimpert. *Journal of Immunology*, v. 78, Jan. 1957, p. 45-55.

A method of calculating the effective incident ultra-violet energy available in the Oppenheimer Centri-Filmer and its practical application as an inactivation procedure discussed in terms of actual experimental findings with virus-infected tissue culture suspensions.

7975* Photographing Precipitation Bands. Douglas F. Lawson. *Journal of Photographic Science*, v. 5, Jan.-Feb. 1957, p. 1-4.

Technique and apparatus which achieve marked band definition and resolution, reducing the photographing of gel plate precipitation patterns to an effortless routine.

7976 (Russian.) Effect of Insulin on Yeast Fermentation. **Utjetsaj inzulina na vren'e kvastsa.** I. Berkesh and P. Berkesh-Tomashevich. *Khemiskog Drushtva Beograd, Glasnik*, v. 21, no. 2, 1956, p. 105-110.

A possible explanation of the insulin effect on glucose metabolism by fermenting yeast is given.

7977 Methods in Enzymology. Sidney P. Colowick and Nathan O. Kaplan, editors. v. III. 1154 p. 1957. Academic Press, New York. (QP601 C71m)

The synthesis, isolation, qualitative detection, quantitative determination, and properties of substrates and coenzymes.

7978* The Metabolism of *L*-Threonine and Glycine by Escherichia Coli. Dorothy A. Miller and Sofia Simmonds. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, Feb. 1957, p. 195-203.

7979* The Structure of Alpha Keratin. Maurice L. Huggins. *National Academy of Sciences of the United States of America, Proceedings*, v. 43, Feb. 1957, p. 204-209.

7980* A Comparative Study of Photoreceptors. Jerome J. Wolken. *New York Academy of Sciences, Transactions*, v. 19, Feb. 1957, p. 315-327.

Structure of photoreceptors; dimensions of pigment macromolecule; spectral sensitivity of the organisms; photochemistry of the pigment complexes.

7981* Biological Effects of Fast Neutrons From an Internal Target Cyclotron: Physical Methods and Dominant Lethals in *Drosophila*. C. W. Sheppard, M. Slater, E. B. Darden, Jr., A. W. Kimball, G. J. Atta, C. W. Edington, and W. K. Baker. *Radiation Research*, v. 6, Feb. 1957, p. 173-187.

Various improvements in dosimetry were made.

7982 Rauwolfia: Botany, Pharmacognosy, Chemistry & Pharmacology. Robert E. Woodson, Jr., Heber W. Youngken, Emil Schlittler, and Jurg A. Schneider. 149 p. 1957. Little, Brown and Co., Boston. (QK495.A66 W86r)

This critical and complete review of Rauwolfia and its alkaloids is intended to stimulate further fundamental research into its pharmacological value, particularly in the therapy of mental illness.

7983 Biological Applications of the Carbon Replica Technique. D. E. Bradley. *Research*, v. 10, Mar. 1957, p. 80-86.

Preparation of replicas; application to examination of minute structures present on the surface of viruses, bacteria, pollen grains, and other botanical and zoological specimens.

7984 Use of Urea and Salicylate to Elute Antibody From Insoluble Antigen. Irving L. Spar, William F. Bale, and Ruth L. Goodland. *University of Rochester (U. S. Atomic Energy Commission)*, UR-485, Mar. 1957, 18 p. (UF767 Un3.1ru Contin.)

Solutions of 16 to 32% urea and of 10% sodium salicylate were used to separate I^{131} labeled rabbit anti-rat organ antibodies from insoluble rat organ residues acting as antigens. Following removal of eluting agents the antibody retained its specificity for rat organs as measured by *in vivo* and *in vitro* techniques.

7985* Mutations in a Temperature Bacteriophage Affecting Its Ability to Lysogenize *Escherichia coli*. Armin D. Kaiser. *Virology*, v. 3, Feb. 1957, p. 42-61.

Forty independently occurring clear plaque-forming mutants of λ were isolated. Among them three different phenotypes can be recognized. Mixed infection with a pair of phenotypically different mutants, each of which lysogenizes very poorly or not at all, produces the H.F. of lysogenization characteristic of infection with wild type.

7986* Synthesis of Phage-Precursor Nucleic Acid in the Presence of Chloramphenicol. A. D. Hershey and Norman E. Melechen. *Virology*, v. 3, Feb. 1957, p. 207-236.

See also: **8038** (synthesis of vitamin A); **8056** (microbial analysis); **8120** (alkaloid structures); **8137** (synthesis of amino acids); **8146** (carcinogenic compounds); **9253** (behavior of biocolloids); **9277** (anaerobic digestion of algae); **9337** (bacterial action on paper pulps).

CERAMICS AND CONCRETE

7987* (Russian.) Mechanism of Corrosion of Carbon and Iron Electrodes in Glass Electric Furnaces. **O mekhanizme korrozii zheleznykh i ugol'nykh elektrodov elektricheskikh pechei varki stekla.** S. O. Nalchadzhian. *Akademii Nauk Armianskoi SSR*, v. 9, no. 10, 1956, p. 3-12.

Determination of the cause of corrosion was based on polarograms taken with a.c. passing through the electrode. The corrosion is an electrolysis initiated by the a.c. Derives a formula showing relationship between current density, frequency, temperature, and the electrode surface.

7988 Technology of Uranium Dioxide, a Reactor Material. J. R. Johnson, S. D. Fulkerson, and A. J. Taylor. *American Ceramic Society, Bulletin*, v. 36, Mar. 1957, p. 112-117.

Physical properties, oxidation behavior, and reactions. Methods of preparation and fabrication.

7989 Role of Grain Boundaries in Sintering. J. E. Burke. *American Ceramic Society, Journal*, v. 40, Mar. 1957, p. 80-85.

Grain growth during sintering changes the configuration of grain boundaries relative to pores and thus may markedly influence the shrinkage rate. Greatest densities are attained when grain growth is inhibited.

7990 Dielectric Studies in the System CdO-Nb_2O_5. A. deBretteville Jr., F. A. Halden, T. Vasilos, and L. Reed. *American Ceramic Society, Journal*, v. 40, Mar. 1957, p. 86-89.

Effect of compositional changes and impurities on the electrical characteristics of single-crystal, hot- and dry-pressed, and fired cadmium niobate. Specimens of compositions from $CdNb_2O_6$ to $Cd_{2.1}Nb_2O_{7.1}$ were studied optically, electrically, and by X-ray diffraction.

7991 Structural Interpretation of Immiscibility in Oxide Systems. I. Analysis and Calculation of Immiscibility. Ernest M. Levin and Stanley Block. *American Ceramic Society, Journal*, v. 40, Mar. 1957, p. 95-106.

Crystal chemistry principles are applied to the quantitative interpretation of immiscibility in nineteen binary and eight ternary glass systems.

7992* Structural Refractory Concrete. Herman G. Protze. *American Concrete Institute, Journal*, v. 28, Mar. 1957, p. 871-887; *ACI Proceedings*, v. 53, 1957, p. 871-887.

Theoretical and practical problems in the construction of jet engine test cell exhaust structures are considered, including the development and use of proper materials, mixtures, equipment, and methods for installation of durable structural refractory lightweight aluminous-cement concretes.

7993* (German.) A Contribution to Quartz - Cristobalite Conversion. **Beitrag zur Quarz-Cristobalit-Umwandlung. II.** Effect of Temperature, Time and Surface Size on the Conversion Process of Boulders of Quartzite and of Rock Crystal. **Einfluss von temperatur, Zeit und Oberflächengrösse auf das Umwandlungsverhalten von Findlingsquarzit und Bergkristall.** Hans-Ernst Schwiete and Hans Stollenwerk. *Archiv für das Eisenhüttenwesen*, v. 28, Jan. 1957, p. 17-30.

A quantitative X-ray analysis showed a definite influence of temperature, time, and grain or surface size on the conversion. This was more rapid in the case of quartzite.

7994 Development and Operation of an Automatic Press for Ceramic Powers. R. A. Bach, O. E. Layton, and J. H. Handwerk. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5669, Jan. 1957, 10 p. (UF767 Un3.1an Contin.)

Construction of a small automatic pelleting press. Details of the piping and timing mechanism, sequence of operation, and granulation procedure.

7995* Bibliography on Glass Structure. W. G. Lawrence, compiler. 52 p. 1956. Research Committee American Ceramic Society. (Z6046 L43b)

Includes 235 annotated references.

7996 Oxide Fuel Elements for High Temperatures. J. H. Handwerk and R. A. Noland. *Chemical Engineering Progress*, v. 53, Feb. 1957, p. 60F-62F.

Thoria-urania fuel elements are corrosion resistant to water at high temperatures.

7997* (French.) Variations of the Viscosity of Molten Glass With Temperature. **La viscosité des verres fondus en fonction de la température.** J. Cornelissen, J. van Leeuwen, and H.-L. Waterman. *Chimie & Industrie*, v. 77, Jan. 1957, p. 69-90.

Adaptation of a formula developed for the determination of mixtures of hydrocarbons to glass mixes.

7998* (French.) The Physical Chemistry of Feldspars and of the Vitreous State. **Chimie physique des feldspaths et de l'état vitreux.** André Roos. *Chimie & Industrie*, v. 77, Feb. 1957, p. 289-296.

Reviews spatial configurations and discusses the ionic properties of metallic elements and their effect upon the properties of ceramic compounds.

7999 Importance of the Spinel Phase in the Steel Industry. I. E. F. Osborn. *Industrial Heating*, v. 24, Mar. 1957, p. 575 + 2 pages.

Crystal chemistry of spinels; spinel in magnesia refractories. (To be continued.)

8000 (French.) Results of Load Tests on Beehive Sections of Cowper Apparatus. **Résultats d'essais de fluage sur ruchages d'appareils cowpers.** J. Baron. *Institut de Recherches de la Sidérurgie, Publications*, ser. A, no. 131, Feb. 1957, p. 78-87. (Reprinted from *La Documentation Métallurgique*, Aug. 15, 1956, p. 78-87.) (TN602 In7p Vis.)

Tests were performed to determine behavior of refractories under stress at high temperature. Porosity and permeability proved more important than refractoriness.

8001 Co-Operative Trials on All-Basic Furnace Roofs. *Iron and Steel Institute, Journal*, v. 185, Mar. 1957, p. 304-328 + 1 plate.

All-basic open-hearth roof trials at four steel plants are described. Furnace design and operation appear to dominate behavior of the bricks in service, but volume stability at 1700 C, high resistance to thermal shock, and high refractoriness-under-load also contribute to long campaign life.

8002 Magnesium-Copper-Manganese-Aluminum Ferrites for Microwave Applications. L. G. Van Uitert. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 320-322.

By replacing some of the Mg in Mg-Mn-Al ferrites, with Cu it is possible to obtain samples with high relative densities and d.c. resistivities by firing in the 1250 to 1300 C range. Data on the saturation inductions, Curie temperatures, densities, and d.c. resistivities is given.

8003 Effect of Irradiation on the Low-Temperature Specific Heat of Graphite. W. DeSorbo and W. W. Tyler. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 244-247.

Specific heat of the irradiated graphite was appreciably larger than that of unirradiated graphite. This difference is explained by assuming that interplanar atoms or clusters of atoms give rise to modes of low energy which contribute to the specific heat at lower temperatures than do the normal lattice modes.

8004 The Diffusion of Sodium and Iodide Ions and of Urea in Clay Pastes. A. H. Bloksma. *Journal of Colloid Science*, v. 12, Feb. 1957, p. 40-52.

Data on the mobilities of ions adsorbed on the clay minerals montmorillonite and kaolinite.

8005 Surface Properties of Irradiated Graphite. C. N. Spalaris, L. P. Bupp, and E. C. Gilbert. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 350-354.

Measurements of surface area, density, heat of adsorption, and pore size distribution indicate that the magnitude of these properties decreases with increasing irradiation exposures.

8006 (Italian.) The Behavior of Silica Bricks in Electric Furnace Roofs. **Contributo allo studio del comportamento dei mattoni di silice nelle volte dei forni elettrici.** E. Biagiotti and G. Grungo. *Metallurgia Italiana*, v. 49, Jan. 1957, p. 35-43.

A study of behavior in roofs under varying working conditions. Results obtained with various types of bricks. Description of the destruction process in each case. Effects of tridymite content of bricks.

8007* The Development of Refractory Nozzle Blades for Use in High-Temperature Gas Turbines. T. H. Blakeley and R. F. Darling. *North East Coast Institution of Engineers & Shipbuilders, Transactions*, v. 73, Mar. 1957, p. 231-252.

Numerous materials and methods of manufacturing the required blade shapes were tested up to 2200 F. Several materials had reasonably good thermal shock resistance; creep strength at high temperature appeared to be the most serious limitation.

8008 X-Ray and Neutron Diffraction Study of Antiferroelectric Lead Zirconate, $PbZrO_3$. F. Jona, G. Shirane, F. Mazzi, and R. Pepinsky. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 849-856.

Symmetry is orthorhombic with lattice parameters a=5.88 A, b=11.77 A, c=8.22 A. The space group is *Pba* 2, and there are eight formula units in the unit cell. Structure results from slight distortions of the cubic perovskite lattice, which the crystal assumes above 230 C.

8009 Neutron Diffraction Study of Orthorhombic $BaTiO_3$. G. Shirane, H. Danner, and R. Pepinsky. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 856-860.

Pillar-shaped crystals with their major axes along the cubic [110] direction were maintained as single domains by the application of an electric field. The structure deduced can be viewed as a framework of slightly distored oxygen octahedra, in which the central Ti ions are displaced towards one of the octahedron edges (polar axis) by 0.13 A.

8010 Symmetry of the Low-Temperature Phase of $BaTiO_3$. Franco Jona and Ray Pepinsky. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 861-864.

Even though the low-temperature phase can be described in terms of a unit cell with rhombohedral dimensions, the true symmetry appears lower. The sequence of phase transitions suggests monoclinic symmetry, but triclinic symmetry cannot be ruled out.

8011* (English and German.) **Solid State Reactions in the System MgO-MgF_2-SiO_2.** Takashi Fujii and Wilhelm Eitel. *Radex Rundschau*, no. 1, Feb. 1957, p. 445-469.

8012* (German.) Effect of Lithium in Ceramic Bodies and Glazes. **Die Bedeutung des Lithiums in keramischen Massen und Glassuren.** M. Mehmel. *Sprechsaal*, v. 90, Feb. 1957, p. 90-91; Mar. 1957, p. 111-115.

Description of Li minerals, their characteristics and properties. The system Li_2O-Al_2O_3-SiO_2 and ceramic bodies on $LiO \cdot Al_2O_3$ base. Use of Li_2O usually results in a decrease in sintering temperature and thermal expansion, and an increase in transparency, gloss, and acidity.

8013 The Stability of High-Temperature Oxides. Frank Terrance Green. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3633, Jan. 1957, 20 p. (UF767 U3u Contin.)

The thermodynamic instability of SiO at all temperatures was proven by means of high-temperature differential thermal analysis. An oxide of Mg is shown to be the responsible species in the complex ultra-violet spectrum of MgO.

8014* (French.) A Contribution to the Study of Gases in Glass. **Contribution a l'étude des gaz dans le verre.** Francis Mahieux. *Verres et Réfractaires*, v. 10, Nov.-Dec. 1956, p. 342-356.

Presence of CO_2, SO_4, and SO_3 in glass as a result of melting procedures, dissociation, or absorption.

See also: **8604** (checker brick); **8659** (strength of concrete); **8664** (prestressed concrete columns); **8675** (creep of reinforced concrete); **8733** (corrosion of steel reinforcement in concrete); **8765** (chrome magnesite open-hearth refractories); **8919** (ceramic machine tools); **9181** (Pb ferrites); **9197** (magnetic properties of $BaAl_2Fe_{12}O_{19}$); **9204** (refractive index of Se glass); **9308** (coloring glass fiber textiles).

CHEMICAL ENGINEERING

8015 Methylene Chloride in Aerosol Products. II. Bulk Storage. Winston H. Reed and T. M. Swain. *Aerosol Age*, v. 2, Mar. 1957, p. 20 + 3 pages.

Practical methods of bulk storage of methylene chloride; cost factors.

8016 Design and Operation of a Commercial Soybean-Oil Refining Plant, Using Acetic Anhydride as a Degumming Reagent. Noel W. Myers. *American Oil Chemists' Society, Journal*, v. 34, Mar. 1957, p. 93-96.

The "Staley 50" oil process was demonstrated on a commercial scale to be physically possible and economically attractive to refiners of soybean oil. Flavor and stability characteristics of the finished oil are identical with the conventional caustic-refined product.

8017 Gas-Liquid Flow in Stacked Towers. Max Leva. *Chemical Engineering*, v. 64, Apr. 1957, p. 267-270.

Packing arrangement, installation, and performance. Capacity data.

8018 Chemical Engineering Practice. v. I. General. v. III. Solid Systems. Herbert W. Cremer and Trefor Davies, editors. Academic Press, New York. (TP155 C42e)

In the first volume of this 12-volume series are papers concerning the chemical engineer, economics of production, pilot plant and semi-commercial works, and preparation of flow diagrams for full-scale production. The third volume deals with size reduction, screening, grading, classifying, and cleaning gaseous media.

8019 Prediction of Ternary Liquid-Liquid Equilibrium From Binary Data (for the System Furfural-Isooctane-Benzene). J. W. Kenny. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 116-122.

8020 Flooding Velocities in Packed Columns Operating at Reduced Pressures. H. Sawistowski. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 138-140.

8021* (German.) Reaction Mechanism in the Substratum During Heterogeneous Catalysis. **Der Reaktionsmechanismus am Substrat bei der Heterogenen Katalyse.** Otto Neunhoeffer. *Chemische Technik*, v. 9, Jan. 1957, p. 3-6.

Study of a simple hydrogenation reaction and the catalyzer effect on the double bond formed.

8022* (French.) Rotating Ribbon Distillation Column. **Colonne de distillation à bande tournante.** M. Rousseau. *Chimie Analytique*, v. 39, Mar. 1957, p. 94-101.

Description and characteristics of distillation columns using rotating ribbons. Applications in analysis and research laboratories.

8023* (German.) Hydrolysis of Sodium Tripolyphosphate in Spray-Drying of Washing Agents. **Hydrolyse des Natriumtripolyphosphats beim Sprühtrocknen von Waschmittel-Ansätzen.** O. Pfrengle. *Fette, Seifen, Anstrichmittel*, v. 58, Dec. 1956, p. 1029-1038.

8024 Fluid Agitation Handbook. Experimental Agitator, Model ELB. 46 p. 1956. Chemineer, Inc., Dayton. (TP156.M5 C42f)

Physical properties of fluids as related to mixing; propellers, turbines, and paddles; concepts and methods of scale-up; design and use of the ELB agitator; mixer installations; commercial agitation equipment.

8025 Liquid-Vapor Equilibrium in the System Nitric Acid-Water-Trace Fluoride. Robert Lee Moore. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-47813, Jan. 1957, 15 p. (UF767 Un3.1hw Contin.)

8026 Venturi Washer Design. R. M. G. Boucher, M. L. Franck, and W. Fortman. *Industrial Chemist*, v. 33, Mar. 1957, p. 113-122.

Design and application of a scrubber operating by the mutual action of two micromists. Mechanism of agglomeration processes.

8027 Phosphoric Acid by the Clinker Process. C. C. Legal, Jr., J. N. Pryor, T. O. Tongue, and P. L. Veltman. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 334-337.

Strong, wet, relatively pure acid is obtained directly from phosphate rock without concentration.

8028 Solvent Extraction of Wax and Ursolic Acid From Cranberry Skins. Lionel K. Arnold and Pong R. Hsia. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 360-363.

Special continuous countercurrent extraction equipment, designed for soy-bean oil extraction, can be used to extract waxes and ursolic acid from cranberry skins with trichloroethylene or ethylene dichloride as solvents.

8029 Recovery of Sulfur Dioxide From Flue Gases. Grady Tarbutton, J. C. Driskell, T. M. Jones, F. J. Gray, and C. M. Smith. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 392-395.

Small scale studies of the direct and indirect H_2SO_4, direct $(NH_4)_2SO_4$, and direct phosphatic fertilizer processes shows that all but the last are technically feasible, while the indirect H_2SO_4 process is most promising.

8030 New Still and Method for Determining Vapor-Liquid Equilibrium. Billy G. Harper and John C. Moore. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 411-414.

Equilibrium data on binary mixtures may be measured by this novel method without analyzing the vapor or liquid samples.

8031 Thermal Conductivity of Liquids. D. K. H. Briggs. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 418-421.

A general equation for commercial tar distillate fractions useful over the temperature range 20 to 150 C.

8032 Spontaneous Ignition Temperature of Hydrocarbons. Correlation With Behavior on Vapor-Phase Oxidation in a Flowing System. Donald E. Swarts and Milton Orchin. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 432-436.

A three-dimensional diagram illustrates the dependence of spontaneous ignition temperatures on surface-volume ratio of the apparatus and the effect of pressure.

8033 Unit Operations Review. *Industrial and Engineering Chemistry*, v. 49, pt. 2, Mar. 1957, p. 457-537.

Review articles on absorption, humidification, adsorption, crystallization, drying, evaporation, filtration, flotation, flow of fluids, high temperature distillation, ion exchange, liquid extraction, materials handling, mixing, and size reduction.

8034 Fundamentals of Chemical Engineering Review. *Industrial and Engineering Chemistry*, v. 49, pt. 2, Mar. 1957, p. 538-626.

Review articles on colloids and surface behavior; computers, mathematics, statistics, and automation; diffusion and oxidation of solid metals; heat transfer; mass transfer; thermodynamics; fluid dynamics; chemisorption and surface catalysis; molecular transport properties of fluids; and thermodynamics.

8035 Overall and Liquid Film Efficiencies in a Kaskade Column. F. H. Garner, S. R. M. Ellis, and E. S. Luxon. *Institute of Petroleum, Journal*, v. 43, Mar. 1957, p. 86-93.

Over-all efficiencies are presented for the systems methylcyclohexane-toluene and methyl-alcohol-water and liquid film efficiencies for the desorption of O from water. At total reflux, the gas film resistance decreases with increasing vapor velocity, whereas liquid film resistance remains constant.

8036 Introduction to the Study of Chemical Reactions in Flow Systems. S. S. Penner. 86 p. 1955. Butterworths Scientific Publications, London. (QD501 P38c)

Classical chemical kinetics; conservation laws and transport coefficients in reacting mixtures; chemical reactions during adiabatic expansion through a de Laval nozzle; heterogeneous chemical reactions.

8037* Manufacture and Properties of Carbon Tetrachloride and Chlorobromomethane. J. O. Grice. *Manufacturing Chemist*, v. 28, Mar. 1957, p. 116-119.

8038* Large-Scale Synthesis of Vitamin A. R. G. Sims. *Manufacturing Chemist*, v. 28, Mar. 1957, p. 128-130.

Citral and methylvinylketone are the starting materials used. Commercial forms are prepared from vitamin A acetate or palmitate for incorporation in pharmaceuticals and food, notably margarine and animal feed stuffs.

8039 Production of Elemental Phosphorus. V. N. Antaki. *Mining Engineering*, v. 9, Mar. 1957, p. 339-341.

Discusses economics and processes involved.

8040 48 Selected Plant Processes. *Oil and Gas Journal*, v. 55, Mar. 25, 1957, p. 121-168.

Flow sheets and flow descriptions of 48 processes for today's refining needs.

8041* (Czech.) Acid Scrubber for Washing Ammonia from Coke-Oven Gas. **Kyselinová pračka na vypírání čpavku z koksárenského plynu.** K. Kabele. *Paliva*, v. 37, Feb. 1957, p. 56-58.

Construction, operation, and experience with apparatus which compares favorably with the saturating type of equipment.

8042 Condenser Operation and Design. II. Low-Finned Exchanger Tubing. Robert G. Newell. *Petroleum Processing*, v. 12, Mar. 1957, p. 86-90.

Heat transfer coefficients and other basic information for the design engineer.

8043 Examine Solvent Dewaxing. I. R. Rautschka, H. Poll, and F. Pass. *Petroleum Refiner*, v. 36, Mar. 1957, p. 165-168.

Factors that influence the dewaxing of mineral oils with solvent mixtures.

8044 Simplify Flash Distillation Calculations. C. D. Holland and R. R. Davison. *Petroleum Refiner*, v. 36, Mar. 1957, p. 183-187.

Solutions in a form suitable for digital computer calculations.

8045* Available Raw Materials and Product Needs Put the Big Squeeze on Refinery Operations. *Petroleum Week*, v. 4, Mar. 22, 1957, p. 35 + 11 pages.

Processing flexibility is becoming increasingly limited due to pressures of the quality, quantity, and value of refined products, and the type and price of crude. The definite trend in process development and new refinery building is to make maximum gasoline yields.

8046* Polk's Chemical and Oil Directory. 336 p. 1956-1957. R. L. Polk & Co., Nashville. (T13 C42p Ref.)

Officers, key personnel, location of plants and branches, also the products manufactured by each company engaged in the chemical or oil industry.

8047* (Polish.) Investigation of the Application of Activated Alumina for Drying Gases. **Badania nad aktywnym tlenkiem glinu jako środkiem do osuszania gazów.** A. Bielánski and M. Burk. *Przemysł Chemiczny*, v. 13, Jan. 1957, p. 35-39.

Determination of adsorption properties and regeneration capacity. Influence of grain size.

8048 Charging and Precipitation Characteristics of Sub-Micron Particles in the Rohmann Electrostatic Particle Separator. Thomas T. Mercer. *University of Rochester (U. S. Atomic Energy Commission)*, UR-475, Feb. 1957, 48 p. (UF767 Un3.1ru Contin.)

Experiments with NaCl particles indicate that the separation of sub-micron particles into discrete size groups by electrostatic means is not generally feasible.

8049* Manipulation of Radioactive Gases in High Vacuum Apparatus. E. J. Wilson. *Vacuum*, v. 4, July 1954, p. 303-325.

Details of apparatus made entirely of glass, the safe thickness of which can be calculated, for study of tritium, krypton-85, and xenon-133.

8050* A Filtration Plant of Novel Design. Herbert O. Hartung. *Water & Sewage Works*, v. 104, Mar. 1957, p. 89-95.

New plant features contact-basin stabilization and submerged filtration.

See also: **8348** (data reduction for chemical plants); **8401** (manufacture of Ni-Cd batteries); **8407** (electrolytic preparation of periodate oxystarch); **8632** (continuous control of pH); **8703** (metallic construction materials); **8734** (cooling tower corrosion inhibitors); **9019** (quality of chemical equipment); **9040** (nuclear-energy application); **9157** (ion exchange methods); **9246** (chemical applications of PVC); **9390** (fire protection in chemical industry).

CHEMISTRY—ANALYTICAL

8051* (German.) Instrument for the Routine Plant Determination of Gas Contents of Aluminium Heats. **Ein neues Gerät zur betriebsmässigen Bestimmung des Gasgehaltes von Aluminium-Schmelzen.** *Aluminium*, v. 33, Mar. 1957, p. 162-163.

8052 Separation of Niobium and Tantalum by Liquid Extraction. Ernest L. Koerner, Jr., Morton Smutz, and H. A. Wilhelm. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-802, Dec. 1956, 63 p. (UF767 Un3.1is Contin.)

Separation and purification by hexone extraction. Cost analysis.

8053* The Determination, by Radioactivation, of Small Quantities of Nickel, Cobalt and Copper in Rocks, Marine Sediments and Meteorites. A. A. Smales, D. Mapper, and A. J. Wood. *Analyst*, v. 82, Feb. 1957, p. 75-88.

8054* The Absorptiometric Determination of Microgram Quantities of Uranium With the Thoronol Complex of Quadrivalent Uranium. J. K. Foreman, C. J. Riley, and T. D. Smith. *Analyst*, v. 82, Feb. 1957, p. 89-95.

8055* (German.) Paper Chromatography of Polynuclear Aromatic Substances. **Papierchromatographie von mehrkernigen Aromaten.** Th. Wieland and W. Kracht. *Angewandte Chemie*, v. 69, Mar. 7, 1957, p. 172-174.

Method permits separation of isomers such as perylene and 3,4-benzopyrene.

8056* Analytical Microbiology. II. The Diffusion Methods. John J. Gavin. *Applied Microbiology*, v. 5, Jan. 1957, p. 25-33.

Types of diffusion; factors that influence diffusion assays; zones of inhibition and exhibition; accuracy of results; advantages and disadvantages of the method.

8057* (Russian.) Quantitative Determination of Iodine and Iodides by Using a Hydrochloric Acid Solution of Iodine Trichloride. **Kolichestvennoe opredelenie ioda i iodidov solianokislym rastvorom trekhkhloristogo ida.** F. E. Kagan. *Aptechnoe Delo*, v. 6, Jan.-Feb. 1957, p. 14-17.

Method of direct titration in the presence of chloroform with ICl_3 in HCl solution. The method is especially useful for determination of I and iodides in a small sample because a g. equiv. of KI=¾-and HgI_2=½- of the g. mol. wt.

8058* (German.) The Use of Complexometry in Metallurgical Analyses. **Ein Beitrag zur Anwendung komplexometrischer Analysenverfahren im Eisenhüttenlaboratorium.** Hans-Léon Wengler and Werner Ausel. *Archiv für das Eisenhüttenwesen*, v. 28, Jan. 1957, p. 7-12.

Methods for analysis of lime, dolomite, sinter, slag, and other materials. Some of the difficulties were overcome, and advantages of the method are shown by examples.

8059* A Chromatographic Method of Analysis for Thiols. C. A. Price and C. W. Campbell. *Biochemical Journal*, v. 65, Mar. 1957, p. 512-516.

The thiol is first treated with *N*-(4-hydroxy-1-naphthyl) *iso*-maleimide and after chromatographic development detected with tetraazotized di-*o*-anisidine.

8060 The Infrared and Raman Spectra of Disulphur Decafluoride (S_2F_{10}). J. K. Wilmshurst and H. J. Bernstein. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 191-201.

8061 The Infrared Spectra of CH_4, CH_3D, CH_2D_2, CD_3H, and CD_4. J. K. Wilmshurst and H. J. Bernstein. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 226-235.

8062 Determination of Sulphate Acid Ester in Unstabilized Cellulose Nitrate. Paul E. Gagnon, Karl F. Keirstead, and Donald Yamasaki. *Canadian Journal of Technology*, v. 34, Mar. 1957, p. 477-484.

Satisfactory procedures include titration in water, determination of Ca after ion exchange, hydrolysis in acetone-water solution, or determination of sulphate after treatment with 50% alcohol.

8063 Rapid Analytical Techniques at Canadian Exploration, Limited. B. Wilson. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 143-146.

Advice for anyone who is contemplating the purchase of analytical instruments for rapid routine analyses.

8064 The Determination of Precious Metals in Ores. Clyde L. Lewis. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 163-167.

Results from 126 fire assays made on three samples are reported.

8065 Gas Chromatography, a Review of Recent Progress. R. R. Barefoot and J. E. Currah. *Chemistry in Canada*, v. 9, Mar. 1957, p. 68 + 2 pages.

8066 The Chromatimer or Chromatograph Monitor. G. G. Blake. *Chemistry & Industry*, no. 9, Mar. 2, 1957, p. 248-249.

A device for stopping the progress of chromatographic formation automatically at any stage.

8067* (Italian.) Quantitative Determination of Melamine by Precipitating With Cyanuric Acid. **Sulla determinazione quantitativa della melammina per precipitazione con acido cianurico.** Luisa Nebbia, Franco Guerrieri, and Basilio Pagani. *Chimica e l'Industria*, v. 39, Feb. 1957, p. 81-83.

With cyanuric acid, melamine forms melamine cyanurate, which is very insoluble in water at 18-20 C. Determining melamine with cyanuric acid can be done by measuring the weight (with ± 0.3% error). The melamine content is measured with fair accuracy in amounts of 5 to 50 mg.

8068* (German.) Rapid Quantitative Determination of Silicon in Cast Iron Production. **Betriebsanalytische Schnellbestimmung von Silicium in Gusseisen.** Jacques Gremminger and Luigi Piatti. *Chimia (Switzerland)*, v. 11, Feb. 1957, p. 48-50.

A method based on converting all of Si into SiO_2. In 10 min. a result can be obtained. Accuracy is + 0.1% Si.

8069* (German.) Electrochemical Method for Determination of Lipoxydase Activity in Grain and Grain Products. **Elektrochemische Methode zur Bestimmung der Lipoxydase-Aktivität in Getreide und Getreideprodukten.** M. Rohrlich, F. Tödt, and G. Ziehmann. *Fette, Seifen, Anstrichmittel*, v. 58, Dec. 1956, p. 1057-1059.

Method offers the possibility of measuring the enzymatic oxidation of linoleic and linolenic acids.

8070 The Separation of Naphthalene and Its Hydrogenated Products by Vapour-Phase Chromatography. R. M. Soemantri and H. I. Waterman. *Institute of Petroleum, Journal*, v. 43, Mar. 1957, p. 94-99.

8071 Gamma Absorptiometric Sedimentation Analysis in Liquid Metal-Solid Oxide Systems. S. C. Furman. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1648, Jan. 1957, 16 p. (UF767 Un3.1ka Contin.)

Method for determining concentration and rate of settling of particulate U compounds in NaK or Na depends on the difference between absorption of γ radiation by the U compound and that by the Na.

8072* (English.) **Investigation on Several Methods of Determination of Fluoride Ion.** Wataru Funasaka, Makoto Kawane, and Tsuguo Kojima. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 18, Oct. 1956, p. 414-523.

The lead chloro-fluoride method for gravimetric analysis, the $AlCl_3$ method for volumetric analysis, and the Th-Alizarin and Zr-Alizarin methods for colorimetric analysis are most suitable.

8073 Determination of Lead in Lead Fluoborate Solutions. Gunner Gabrielson. *Metal Finishing*, v. 55, Mar. 1957, p. 56-57.

Titration using ethylinediamine tetraacetic and Eriochrome Black T indicator is recommended.

8074* (German.) Microtitration With Ethylenediaminetetraacetic Acid. **Mikrotitrationen mit Äthylendiamintetraessigsäure. XVI.** Metal Determination in the Ultramicro Range. **Metallbestimmungen im Ultramikrobereich.** H. Flaschka and F. Sadek. *Mikrochimica Acta*, no. 1, 1956, p. 1-18.

Examples of determining metals with the complexometric indicators, eriochrome black T, PAN, and pyrocatechin violet are given. Determinations can be made within 1μl. of 0.001 M solution.

8075* (English.) **A Relationship Between Interfering Substances in Flame Spectrophotometry.** Shouzow Fukushima, Misako Shigemoto, Isao Kato, and Kiyoteru Otozai. *Mikrochimica Acta*, no. 1, 1957, p. 35-70.

Interference with Li, Na, K, Rb, Cs, Ca, and Ba radiations of other constituents was surveyed by the Beckman DU quartz spectrophotometer.

8076* (German.) Carbon, Hydrogen, and Fluorine Determination in Organic Compounds. **Kohlenstoff-, Wasserstoff- und Fluorbestimmung in organischen Verbindungen.** Ladislaus Mázor. *Mikrochimica Acta*, no. 1, 1957, p. 113-124.

A combustion method.

8077 Determination of Iron, Chromium, and Nickel by X-Ray Fluorescence Aqueous Solution Method. Louis Silverman and William W. Houk. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1788, Mar. 1957, 12 p. (UF767 Un3.1na Contin.)

Steel samples were dissolved in aqua regia and HF, fumed with $HClO_4$, and diluted to volume with water. Fluorescence data were obtained for specific K alpha lines, the intensities compared to the background intensity reading obtained at 0.6 A, and the values obtained from a standard plot.

8078 Determination of Uranium in Solution by X-Ray Spectrometry. Harry M. Wilson and G. V. Wheeler. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission)*, IDO-14393, Feb. 1957, 17 p. (UF767 Un3.1id Contin.)

Uranium in HNO_3 solution is excited by a primary X-ray beam from a Mo tube. The intensity of fluorescent uranium $L\alpha_1$ line is measured by means of a crystal spectrometer employing a scintillation counter and pulse height analyzer. This is converted to concentration by relating to standard solutions.

8079* Studies on Flame Spectrochemical Analysis. VIII. On the Self Interference and Mutual Interference of Alkali Elements. IX. The Interaction of Alkaline Earth Elements. X. Influence of Some Diverse Substances on the Flame Spectra of Alkaline Earth Metals. Shigerô Ikeda. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, Feb. 1957, p. 1-23.

8080 Analysis of Volatile Aerosol Constituents. M. J. Root and M. J. Maury. *Soap and Chemical Specialties*, v. 33, Mar. 1957, p. 75 + 4 pages.

Apparatus and techniques for qualitative and quantitative analysis by means of gas chromatography. (To be concluded.)

8081* The Development of Methods for the Chemical Determination of Uranium. T. W. Steele. *South African Institute of Mining and Metallurgy, Journal*, v. 57, Nov. 1956, p. 144-152.

Miscellaneous methods developed for routine use on plant samples.

8082* (English.) **Amperometric Titration of Ferrocyanide.** Zenzi Hagiwara. *Technology Reports, Tôhoku University*, v. 21, no. 1, 1956, p. 25-29.

Hexaureachromium (III) chloride complex is used as reagent.

8083 A Determination of Molybdenum in Uranium-Molybdenum Alloys by Monochromatic X-Ray Absorption. William C. Dietrich and Roscoe E. Barringer. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, Y-1153, Feb. 1957, 14 p. (UF767 Un3.1y Contin.)

8084 Vapour Phase Chromatography. D. H. Desty, editor. 436 p. 1957. Academic Press, New York. (QD271 D47v)

Proceedings from a symposium sponsored by the Hydrocarbon Research Group of the Institute of Petroleum. Includes 36 papers on diverse subjects relating to gas chromatography.

8085* (Russian.) Determination of Zirconium in Ores by the Iodate Method. **Opredelenie tsirkoniia v rudakh iodatnym metodom.** Iu. A. Chernikhov and G. I. Kuchmistaia. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 14-18.

Method based on the following: the ore is separated by a mixture of hydrofluoric and sulfuric acids. The nonsoluble residue ($ZrSiO_4$) is filtered out, and the Zr salt is dissolved by melting with potassium bifluoride. The Zr is precipitated from the solution by potassium iodate. The analysis is made by iodometric titration.

8086* (Russian.) Quantitative Determination of Halides in Organic Compounds by Repeated Combustion. **Kolichestvennoe opredelenie galoidov v organicheskikh soedineniiakh metodom dvoinogo cozhzheniia.** N. P. Volynskii, G. D. Gal'pern, and I. K. Chudakova. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 27-29.

Description of the apparatus, methods used, and test results in determining Cl, Br, and I content of organic compounds.

8087* (German.) Precipitation of Four-Valency Selenium With SO_2. **Zur Fällung des vier- und sechswertigen Selens mit SO_2.** Helmut Bode and Hans-Dieter Stemmer. *Zeitschrift für Analytische Chemie*, v. 155, Feb. 1957, p. 96-105.

Precipitation of Se (IV) from 0.5-1.0 NHCl solutions. Separation of Se (IV) from Se (VI) with SO_2.

8088* (German.) Infra-Red Spectrophotometric Investigation of Saturated Linear and Branched Fatty Acids. **Infrarotspektrophotometrische Untersuchung gesättigter linearer und verzweigter Fettsäuren.** Franz Wensel and Ulrich Schiedt. *Zeitschrift für Naturforschung*, v. 12b, Feb. 1957, p. 71-85.

Determination of the basic type of the fatty acid, its C-number and other characteristics.

8089* (Russian.) Spectral Analysis by Evaporation. **Spektral'nyi analiz po metodu ispareniia. II.** Determination of Admixtures of Thorium and Beryllium Compounds by the Above Method. **Opredelenie primesei v soedineniiakh toriia i berilliia metodom ispareniia v vakuume.** A. N. Zaidel', N. I. Kaliteevskii, L. V. Lipis, and M. P. Chaika. *Zhurnal Analiticheskoi Khimii*, v. 12, Jan.-Feb. 1957, p. 17-22 + 1 plate.

The method is most effective in determining impurity traces in high purity samples. The presence of any impurity in the concentration of around 1% essentially decreases the sensitivity of determination of the other impurities.

See also: **7936** (analysis of soils); **7937** (analysis of plants and soils); **7938** (analysis of plants); **7958** (ultracentrifugal analysis of dilute solutions); **8105** (analysis of C^{14} labeled cyanide); **8153** (identification of bitumens); **8161** (analysis of mineral oil); **8510** (analysis of lard); **8551** (analysis of flue gas); **8572** (determination of atmospheric ozone); **8751** (use of Pt crucibles); **9087** (assay of U^{235} content of Th); **9233** (identification of polymers); **9328** (X-ray analytical techniques).

CHEMISTRY—INORGANIC AND GENERAL

8090 Molecular Addition Compounds of Titanium Tetrabromide and Titanium Tetraiodide With Several Ethers. Robert F. Rolsten and Harry H. Sisler. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1068-1070.

Reactions with 1,4-dioxane, tetrahydrofuran, and tetrahydropyran.

8091 A Four-Coördinated Copper (II) Complex With a Tetrahedral Disposition of the Copper Valences. Francis Lions and Kenneth V. Martin. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1273-1275.

8092 Coördination Compounds of Metal Ions With Derivatives and Analogs of Ammoniadiacetic Acid. Robert U. Tichane and William E. Bennett. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1293-1296.

To obtain information as to the effect of the structure of a compound on its ability to act as a chelating agent, values for the first and second formation constants of complexes between metal ions and derivatives and analogs of iminodiacetic acid were determined.

8093 Solvent Extraction Systems. I. As(III) and Ge(IV) in Hydrochloric Acid and As(III) in Hydriodic Acid With Several Solvents. G. O. Brink, P. Kafalas, R. A. Sharp, E. L. Weiss, and J. W. Irvine, Jr. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1303-1305.

Distribution ratios generally increase in a regular manner as the acid concentration is varied from 2 to 12 *F*.

8094 A Synthetic Uranyl Silicate Hydrate. William L. Marshall and James S. Gill. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1300-1301.

Compound was prepared by the reaction of an aqueous UO_2F_2 solution with silica at 300 C. Probable composition was either $(UO_2)_2\ SiO_4 \cdot 3H_2O$ or $(UO_2)_2\ Si_2O_7 \cdot 3H_2O$. It is virtually insoluble in HCl, HNO_3 or H_2SO_4, and is thermally stable to approximately 400 C.

8095 The Separation of Hydrogen and Deuterium by the Reaction of Iron With Steam. Hilton A. Smith and John C. Posey. *American Chemical Society, Journal,* v. 79, Mar. 20, 1957, p. 1310-1313.

Measurements between 118 and 340 C resulted in separation factors from 1.4 to 3.2.

8096 The Formation of Thallium Chloride Complexes and Their Extraction Into Ether. Donald Leonard Horrocks and A. Voigt. *Ames Laboratory (U. S. Atomic Energy Commission),* ISC-703, Nov. 1955, 73 p. (UF767 Un3.1is Contin.)

Radiochemical study of the partition of Tl (III) chloride complexes between $HClO_4$-LiCl-$LiClO_4$ solutions and iso-propyl ether. Empirical formulas and equilibrium constants.

8097 Solvent Extraction Studies With Polonium. K. W. Bagnall and D. S. Robertson. *Chemical Society, Journal,* Feb. 1957, p. 509-512.

The extraction of Po from HCl solution by dithizone may involve the complex $PoODz_2$, and the complex $PoCl_4 \cdot 2TBP$ may be formed in the extraction with tributyl phosphate. Dependence of the partition coefficient on the acid concentration of the aqueous phase was determined for both complex-forming agents.

8098 Structure of Compounds of Ferrocyanide Type. II. Crystal Structure of β-Tetramethyl Ferrocyanide. R. Hulme and H. M. Powell. *Chemical Society, Journal,* Feb. 1957, p. 719-727.

β-Tetramethyl ferrocyanide is orthorhombic, a=8.45, b=13.24, c=11.62 A, has space-group *Pbca*, and the unit cell contains four neutral molecules $Fe(CNMe)_4(CN)_2$. These are centrosymmetric and have the *trans*-octahedral form.

8099 New Complexes Containing Tellurium. E. E. Aynsley and W. A. Campbell. *Chemical Society, Journal,* Feb. 1957, p. 832-834.

Preparation of the urea and the diazine salt of the pentahalogenotellurous acids ($HTeX_5$) in which the stability of the [TeX_5]-anion increases from the chloride through the bromide to the iodide. Preparation of 1, 1 addition compounds of $TeBr_4$ with N_4S_4 and its tetrahydride and dioxan.

8100* (French.) Effect of Sodium Peroxide on Alumina and Vanadic Anhydride. **Action du peroxyde de sodium sur l'alumine et l'anhydride vanadique.** Micheline Viltange-Jacquinot. *Comptes Rendus,* v. 244, Feb. 25, 1957, p. 1215-1217.

Infra-red absorption spectrography between 6 and 30μ was used to identify aluminates and vanadates obtained by heating sodium peroxide with the corresponding oxides.

8101 The Role of Phosphorus Halides in Organic Synthesis. G. Machell. *Industrial Chemistry,* v. 33, Mar. 1957, p. 107-112.

The main reactions of phosphorous trihalides, phosphorous pentahalides, and phosphoryl halides are considered.

8102 Reaction Products of γ Picoline and Iodine. Donald L. Glusker and Arthur Miller. *Journal of Chemical Physics,* v. 26, Feb. 1957, p. 331-337.

Two distinct addition compounds were isolated and studied by chemical, spectroscopic, and X-ray radial distribution methods.

8103 The Equilibria of Cadmium Hydroxide in Acidic and Basic Media at 25°. K. H. Gayer and Leo Woontner. *Journal of Physical Chemistry,* v. 61, Mar. 1957, p. 364-365.

Solubility was studied in $HClO_4$ and in NaOH solution.

8104 The Preparation of Uranium Dioxide Crystals. R. J. Bard. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-2076, Mar. 1957, 31 p. (UF767 U3La Contin.)

Single crystals of UO_2 with a maximum size of about 20μ were obtained by heating UO_2 with fused $Na_2B_4O_7$ as the mineralizing agent at 1100 C in hydrogen.

8105 The Preparation and Analysis of C^{14}-Labeled Cyanide. Joseph D. Moyer and Horace S. Isbell. *National Bureau of Standards (U. S. Atomic Energy Commission),* NBS-4708, June 1956, 20 p. (UF767 Un3.1nb Contin.)

8106 Basic Chemistry of High Temperature Inorganic Systems. Semiannual Progress Report January-June, 1956. S. J. Yosim and T. A. Milne. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1797, Mar. 1957, 23 p. (UF767 Un3.1na Contin.)

Vapor pressure of Th and ThF_4; thermal stability of ThI_4; U-UCl_3 and Bi-$BiCl_3$ solubility studies; vapor pressure of metal-salt solutions.

8107 A Brief Guide to UF_6 Handling. J. W. Arendt, E. W. Powell, and H. W. Saylor. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission),* K-1323, Feb. 1957, 25 p. (UF767 Un3.1k Contin.)

Physical and chemical properties of UF_6. Techniques used in transfer to and from shipping containers.

CHEMISTRY—ORGANIC

8108 Chemistry of Enolates. I. The Kinetics and Mechanism of Alkylation of Alkyl Phenyl Ketones. Harry D. Zook and William L. Rellahan. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 881-886.

Alkylations of sodium enolates prepared from eight primary and secondary alkyl phenyl ketones were measured kinetically. A marked decrease in rate accompanied branching on the α-carbon atom of the ketone.

8109 Cationic Polymerization of Ethylene Oxide. I. Stannic Chloride. II. Boron Trifluoride. D. J. Worsfold and A. M. Eastham. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 897-902.

8110 Solvent and Substituent Effects. Concerning the Baker-Nathan Effect and the Influence of Solvent on the Principal Ulraviolet Spectral Band of Some *p*-Alkylnitrobenzenes and *p*-Alkylacetophenones. W. M. Schubert, Janis Robins, and J. L. Haun. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 910-916.

8111 Free-Radical, Chain Reactions of Diazomethane With Polybromo- and Polyiodomethanes. W. H. Urry, J. R. Eiszner, and J. W. Wilt. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 918-922.

Rapid chain reactions of diazomethane with polybromo- or polyiodomethanes give halide products such as dibromo- or diiodomethane and vinyl or vinylidene bromides or iodides. β-Elimination of a Br or I atom from an intermediate free radical is postulated.

8112 Amine Oxides. I. 1,4-Pentadiene, 3-Phenylpropene and 3-Phenylcylohexene by Amine Oxide Pyrolysis. Arthur C. Cope and Carl L. Bumgardner. **II. Conversion to N, N-Dialkylhydroxylamines.** Arthur C. Cope and Hiok-Huang Lee. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 960-965.

8113 Thermal Rearrangement of Silanecarboxylate Esters. A. G. Brook and R. J. Mauris. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 971-973.

Reaction is essentially intramolecular, and its mechanism is described in terms of a cyclic three-membered intermediate.

8114 Synthesis of Isomeric Bromothiazolylamines and the Use of Their Mercurated Derivatives as Fungicides and Bactericides. G. N. Mahapatra. *American Chemical Society, Journal,* v. 79, Feb. 20, 1957, p. 988-991.

8115 A Synthesis of 4-Androsten-3,17-Dione From 22-(1-Piperidyl)-Bisnor-4,20(22)-Choladien-3-One Via a β-Bromo Ternary Iminium Bromide. R. L. Pederson, J. L. Johnson, R. P. Holysz, and A. C. Ott. *American Chemical Society, Journal,* v. 79, Mar. 5, 1957, p. 1115-1118.

8116 Halogenated Corticoids. I. 9 α-Halogen Derivatives of Cortisone and Hydrocortisone. Josef Fried and Emily F. Sabo. *American Chemical Society, Journal,* v. 79, Mar. 5, 1957, p. 1130-1141.

Synthesis from 11-epi-hydrocortisone.

8117 Synthesis of D-3,4-Di-O-Methyl-Erythritol. Irwin J. Goldstein and F. Smith. *American Chemical Society, Journal,* v. 79, Mar. 5, 1957, p. 1188-1190.

Preparation from methyl 5,6-di-O-methyl-D-glucofuranoside by oxidation with periodate at room temperature, followed by reduction and hydrolysis.

8118 Synthesis of D- and of L-α-*O*-Methylglycerol. Irwin J. Goldstein, J. K. Hamilton, and F. Smith. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1190-1193.

8119 The Structure and Reactions of Gossypol. IV. The Synthesis of Desapogossypol Hexamethyl Ether. David A. Shirley and Walter L. Dean. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1205-1207.

1,1',6,6',7,7' - Hexamethoxy-3,3'-dimethyl- 2,2' - binaphthyl was synthesized and found to be identical with desapogossypol hexamethyl ether, a degradation product of gossypol.

8120 Alkaloid Studies. XVI. Alkaloids of *Rauwolfia tetraphylla* L. The Structures of Tetraphylline and Tetraphyllicine. Carl Djerassi, Jack Fishman, Marvin Gorman, J. P. Kutney, and S. C. Pakrashi. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1217-1222.

8121 The Synthesis of DL-Canaline, DL-Canavanine and Related Compounds. David D. Nyberg and Bert E. Christensen. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1222-1226.

Preparation of O-substituted hydroxylamines and hydroxyguanidines. Synthesis of DL-canaline by a five-step reaction scheme from γ-butyrolactone. DL-Canavanine is prepared directly from DL-canaline.

8122 Substitution of Polynuclear Aromatic Compounds. I. The Friedel-Crafts Benzoylation of Naphthalene. Frederick R. Jensen. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1226-1231.

Rearrangement is not responsible for differences in isomer distribution.

8123 Configuration of Free-Radicals. Non-Stereospecificity of Cis- and Trans-2-Butene-Sulfur Dioxide Copolymerizations. Philip S. Skell, Robert C. Woodworth, and James H. McNamara. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1253-1256.

8124 Sexadentate Chelate Compounds. VIII. Francis P. Dwyer, Naida S. Gill, Eleonora C. Gyarfas, and Francis Lions. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1269-1273.

The tris-salicylidene and tris-(α-pyridylmethylene) derivatives of 2-aminomethyl - 1,3 - diaminopropane were prepared and shown to function as sexadentate chelate compounds.

8125 Olefin Coördination Compounds. II. The Preparation and Infrared Spectral Properties of Olefin-Platinum (II) Chloride Complexes. Hans B. Jonassen and Jack E. Field. **III. Coördination Compounds of Butadiene With Platinum (II), Palladium(II) and Copper (I) Halides.** Philip E. Slade, Jr. and Hans B. Jonassen. **IV. Platinum (II) Complexes With *cis*- and *trans*-2-Butene.** Hans B. Jonassen and Warren B. Kirsch. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1275-1281.

8126 The Relative Rates of Formation of Carbanions by Haloforms. Jack Hine, Norbert W. Burske, Mildred Hine, and Paul B. Langford. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1406-1412.

The effect of structure on reactivity in carbanion formation of haloforms was studied by measurements of the rates of hydroxide ion catalyzed transformation of $CDBr_3$, CDI_3, $CDClBr_2$, $CDICl_2$, CDBrClF to the corresponding protium compounds in homogeneous aqueous solution.

8127 The Reaction of Alkylbenzenes With Iodine Monochloride in Carbon Tetrachloride and in Trifluoroacetic Acid. L. J. Andrews and R. M. Keefer. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1412-1416.

8128 Relative Rates of Bromination of Benzene and the Methylbenzenes. Partial Rate Factors for the Bromination Reaction. Herbert C. Brown and Leon M. Stock. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1421-1425.

8129 The Cleavage of *sym*-Diphenyldisiloxane by Organometallic Compounds. Mack C. Harvey, William H. Nebergall, and John S. Peake. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1437-1439.

Cleavage by organolithium compounds, Grignard reagents, and $LiAlH_4$ was investigated.

8130 Halogen Derivatives of Dibenzo-*p*-Dioxin. Henry Gilman and Joseph J. Dietrich. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1439-1441.

Direct preparations for 2-chloro-, 2,7-dichloro-, 2,7-dibromo-, and 2,3,7,8-tetrabromo-dibenzo-*p*-dioxin from dibenzo-*p*-dioxin are reported. The 1-bromo-dibenzo-*p*-dioxin and the 2-iodo-dibenzo-*p*-dioxin are obtained by indirect methods.

8131 Stobbe-Type Condensation of Ketones (Cyclohexanone and Acetone) With Diethyl Oxalacetate. Gardner W. Stacy, James Wm. Cleary, and Melvin J. Gortatowski. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1451-1455.

Condensation products possess and an α-enol-γ-butyrolactone structure.

8132 Mechanisms for Liquid Phase Hydrolyses of Chlorobenzene and Halotoluenes. Albert T. Bottini and John D. Roberts. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1458-1462.

Hydrolyses involve either a benzyne (elimination-addition) mechanism, which gives both rearranged and unrearranged products, or an Sn2-type mechanism. The latter is favored at lower temperatures, in the presence of weaker bases, and with the more easily ionizable halogens.

8133 The Cyclization Reaction of Di-(*p*-Halogenophenyl)-Trifluoromethylcarbinols. Sasson Cohen. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1499-1502.

Solutions of di-(*p*-halogenophenyl)-trifluoromethylcarbinols in concentrated H_2SO_4 yield 3-halogeno-6-hydroxy-9-trifluoromethylfluorenes upon dilution with water, and the corresponding 6-methoxy compounds upon dilution with methanol.

8134 Synthetic Detergents From Animal Fats. IX. Triethanolammonium, Lithium, Alkaline Earth, and Other Salts of *a*-Sulfonated Fatty Acids. J. K. Weil, R. G. Bistline, Jr., and A. J. Stirton. *American Oil Chemists' Society, Journal*, v. 34, Mar. 1957, p. 100-103.

Preparation of salts; surface-active properties.

8135 Preparation of Long-Chain Fatty Acid Chlorides. C. G. Youngs, A. Epp, B. M. Craig, and H. R. Sallans. *American Oil Chemists' Society, Journal*, v. 34, Mar. 1957, p. 107-108.

Method involves treating the free acid with PCl_5 or PCl_3 in an inert organic solvent and removing the excess chlorinating agent by washing the solvent phase with water.

8136* (German.) Alkylation of Aromatic Amines. **Alkylierung aromatischer Amine.** R. Stroh, J. Ebersberger, H. Haberland, and W. Hahn. *Angewandte Chemie*, v. 69, Feb. 21, 1957, p. 124-131.

A new preparative method for the production of *o*-alkyl-substituted aromatic amines. The reaction is activated by $AlCl_3$.

8137* (English.) **The Mechanism of Synthesis of Amino Acids by Electric Discharges.** Stanley L. Miller. *Biochimica et Biophysica Acta*, v. 23, Mar. 1957, p. 480-489.

Synthesis from CH_4, NH_3, H_2O, and H_2 was investigated. Hydrogen cyanide and aldehydes react to form amino and hydroxynitriles.

8138* (French.) French Organic Chemistry Nomenclature Committee. **Comité national de la chimie.** *Bulletin de la Société Chimique de France*, no. 1, Jan. 1957, p. 3-82.

Provisional rules on the nomenclature to be used in France in collaboration with the International Nomenclature Committee.

8139* (French.) The Synthesis of Some Di- and Tricyclic Ketones by Means of the Michael Reaction. **La synthèse de quelques cétones di- et tricycliques par la réaction de Michael.** Ernst Bergmann, Raphaël Ikan, and Hannah Weiler-Feilchenfeld. *Bulletin de la Société Chimique de France*, no. 3, Mar. 1957, p. 290-295.

A series of di- and tricyclic ketones were prepared with methyl vinyl ketone, methyl isopropenyl ketone, and alicyclic ketones. According to the spectra of the ketones obtained the double bond is either α-β or β-γ.

8140* (French.) Investigations on Thymol. **Recherches sur le thymol. VII.** Synthesis and Reactivity of Methyl-4 Thymol. **Synthèse et aptitude réactionnelle du méthyl-4 thymol.** René Royer, Pierre Demerseman, Andrée Cheutin, and Michel Hubert-Habart. *Bulletin de la Société Chimique de France*, no. 3, Mar. 1957, p. 304-310.

A new method for the synthesis of methyl-4 thymol and its methylic ether. Reactivity in carboxylation, formylation, halogenation, nitration, and nitrosation. It is shown by means of chemical and spectroscopic examination that the substitutions usually take place in position two.

8141* (French.) Aliphatic Nitrates-Nitriles. **Nitrates-nitriles aliphatiques.** Jacques Boileau, Robert Bouchez, Claude Frejacques, Claude Jacta, and Anne-Marie Pujo. *Bulletin de la Société Chimique de France,* no. 3, Mar. 1957, p. 338-341.

Various compounds of a little known type, possessing the simultaneous nitrate and nitrile functions, were synthesized and their infra-red spectra studied. Nitration of nitrile-alcohols is obtained by reacting H_2SO_4 with HCH_3CO_2 in HNO_3.

8142* (French.) Study of Bicyclic D-Diketones. **Étude sur les δ-dicetones bicycliques. II.** Reduction. **Réduction.** Jean Colonge, Jacques Dreux, and Henri Delplace. *Bulletin de la Société Chimique de France,* no. 3, Mar. 1957, p. 342-345.

The dioxo-2,2' di(cyclanyl) methanes are hydrogenated in bisecondary δ-glycols when the cycles are of the order of five and seven, and in bitertiary tricyclic α-glycols when the cycles are of the order of six.

8143* (French.) Methyl 6-Fulvene. **Le méthyl-6 fulvène.** Jeanne Thiec and Joseph Wiemann. *Bulletin de la Société Chimique de France,* no. 3, Mar. 1957, p. 366-368.

Preparation and properties.

8144 Rearrangement Studies With C^{14}. III. The Friedel-Crafts Alkylation of Anisole With 2-Phenylethyl-1-C^{14} Chloride and 2-Phenylethanol-1-C^{14}. C. C. Lee, A. G. Forman, and A. Rosenthal. *Canadian Journal of Chemistry,* v. 35, Mar. 1957, p. 220-225.

8145 Carbon-Functional Silicones. P. D. George, M. Prober, and J. R. Elliott. *Chemical Reviews,* v. 56, Dec. 1956, p. 1065-1219.

A comprehensive review of pertinent literature through Jan. 1, 1955. Covers syntheses, properties, structures, and typical reactions.

8146 Carcinogenic Nitrogen Compounds. XXI. New Alkyl Homologues of Phenanthridine, Benzacridines, and Related Nuclei. Ng. Ph. Buu-Hoi, P. Jacquignon, and C. T. Long. *Chemical Society, Journal,* Feb. 1957, p. 505-509.

8147 Researches on Polyenes. V. The Synthesis of Cortisalin. D. Marshall and M. C. Whiting. *Chemical Society, Journal,* Feb. 1957, p. 537-542.

The hexaenal form of *p*-methoxybenzaldehyde is condensed with malonic acid, and after decarboxylation the product is esterified with diazomethane and demethylated with $AlBr_3$ to give a product essentially identical with the natural pigment.

8148 Synthesis of Cyclic Hydrocarbons. I. *o*-Dialkylbenzenes. B. B. Elsner, H. E. Strauss, and E. J. Forbes. **II. Dehydrogenation of 1:2-Dialkyl*cyclo*hexanes to *o*-Dialkylbenzenes. III. 1:2-Dialkyl*cyclo*hexanes.** B. B. Elsner and H. E. Strauss. **IV. Alkylindanes.** B. B. Elsner and K. J. Parker. *Chemical Society, Journal,* Feb. 1957, p. 578-600.

8149 The Chemistry of the Triterpenes and Related Compounds. XXX. The Relative Stabilities of Ring-A Unsaturated Hydrocarbons Derived From 3:4-Dimethylcholestane and 3-Methyl-24-Norurs-12-ene. J. L. Beton, T. G. Halsall, E. R. H. Jones, and P. C. Phillips. *Chemical Society, Journal,* Feb. 1957, p. 753-765.

8150 Infrared Absorption Bands Associated With the NH Group. I. Some Secondary Aromatic Amines. D. Hadži and M. Škrbljak. **II. Some Secondary Thioamides and *N*-Methyltoluene-*p*-Sulphonamide.** D. Hadži. *Chemical Society, Journal,* Feb. 1957, p. 843-851.

8151* (German.) Reaction Mechanisms. **Reaktionsmechanismen. XX.** Friedel-Crafts Alkylation. **Friedel-Crafts-Alkylierung.** Volker Franzen. *Chemiker-Zeitung,* v. 81, Feb. 5, 1957, p. 68-71.

A study of the transformation of alkylhalides or alcohols with aromatic hydrocarbons in the presence of Lewis-acids ($AlCl_3$, $GaCL_3$, BF_3) or proton acids.

8152 The Mechanism of Hydrogenation Reactions. F. J. McQuillin. *Chemistry & Industry,* no. 9, Mar. 2, 1957, p. 251-252.

8153* (Italian.) Behavior of Bitumen Porphyrins in Relation to Oxidation. **Comportamento delle porfirine dei bitumi rispetto all'ossidazione.** G. Costantinides and P. Batti. *Chimica e l'Industria,* v. 39, Feb. 1957, p. 96-100.

Study of oxidations of porphyrins contained in Lagunillas and Kuwait petroleum residues. The effect of time, temperature, and oxygen pressure was examined and a method proposed for the identification of oxidized bitumens of different origins.

8154 The Higher Boiling Tar Acids. *Coal Tar Research Association, Coal Tar Science No.* 5, 1957, p. 13-20. (TP953 C63t Contin.)

Tar acids appear to contain three main types of molecular configuration: alkyl substituted hydroxybenzenes which usually contain no more than three and most frequently only two alkyl groups; hydroxyhydrindenes and their alkyl derivatives; and naphthols boiling from about 285 C.

8155* (Spanish.) Reactions of Propylene With Mercury Salts. **Reacciones del propileno con sales mercúricas.** J. L. Martínez Cordón and Vincente Gómez Aranda. *Combustibles,* v. 16, Sept.-Dec. 1956, p. 290-308 + 1 plate.

Preparation and properties of various reaction products.

8156* (French.) The Isolation and Chemical Constitution of Darutoside. The Bitter Element of *Siegesbeckia Orientalis.* **Sur l'isolement et la constitution chimique du darutoside principe amer de siegesbeckia orientalis.** Julio Pudles, Anne Diara, and Edgar Lederer. *Comptes Rendus,* v. 244, Jan. 21, 1957, p. 472-475.

This material is a β-D-glucoside $C_{26}H_{44}O_8$. Its aglucone, called darutigenal is a trihydroxylated diterpene $C_{20}H_{34}O$, which is tricyclic with a double bond and a glycol-1,2 group with a primary hydroxyl.

8157* (French.) Observations Made During the Synthesis of Iodinated Derivatives of Cinchophen. **Sur quelques observations faites au cours de la synthèse de dérivés iodés de l'acide phényl-2 cinchoninique.** N. P. Buu-Hoi and Pierre Jacquignon. *Comptes Rendus,* v. 244, Feb. 4, 1957, p. 786-788.

During the synthesis described, certain points concerning the chemistry of organic I compounds were examined. The directing effect of this halogen during the Friedel-Crafts reactions is stronger than the effect of the methyl group.

8158* (French.) Condensation of α-Brominated Tertiary Esters on Ketones in the Presence of Lithium. **Condensation des esters α-bromés tertiaires sur les cétones en présence de lithium.** Jean Jacques, Andrée Marquet, and Christiane Hattier. *Comptes Rendus,* v. 244, Feb. 11, 1957, p. 905-907.

In the presence of Li, the α-brominated tertiary esters react on aryl-aliphatic ketones and give substituted aroylpropionic esters. This new reaction, under certain conditions, can take place with yields above 70%.

8159* (French.) Unstable Union of Oxygen With Carbon. A Dissociable Photooxide in the Pentagonal Heterocyclic Series: the Lophine Photooxide. **Union labile de l'oxygène au carbone. Un photooxyde dissociable en série hétérocyclique pentagonale: le photooxyde de lophine.** Charles Dufraisse, André Étienne, and Jacques Martel. *Comptes Rendus,* v. 244, Feb. 18, 1957, p. 970-974.

$C_{21}H_{16}N_2$ gives a photooxide that can dissociate at about 50% concentration. For the first time a labile union of O with C was observed in controlled conditions and in a pentacyclic series.

8160* (Russian.) Sequence in the Hydrogenation of Cyclopentadiene Double Bonds on Pd- and Pt-Black. **Posledovatelnost gidrirovaniia dvoinykh sviazei tsiklopentadiena na Pd-I Pt-cherniakh.** L. Kh. Freidlin and B. D. Polkovnikov. *Doklady Akademii Nauk SSSR,* v. 112, Jan.-Feb. 1957, p. 83-85.

In studying this sequence, a reaction was caused to take place in the liquid phase at 25 C at atmospheric pressure in cyclohexane and 96% ethyl alcohol as solvents.

8161* Ring Analysis of Mineral Oil Fractions by Means of Nomograms, Using Kinematic Viscosity, Refractive Index, and Density. J. Cornelissen and H. I. Waterman. *Institute of Petroleum, Journal,* v. 43, Feb. 1957, p. 47-56.

8162* (Russian.) Investigations in the Stereochemistry of Cyclic Compounds. **Issledovanie v oblasti stereokhimii tsiklicheskikh soedinenii. XVI.** Stereochemistry of Dienic Condensation of Cyclopentadiene With Citraconic Anydride and Steric Transformations of Endo- and Exo-Adducts. **Stereokhimiia dienovoi kondensatsii tsiklopentadiena s tsitrakonovym angidridom i prostranstvennye prevrashcheniia endo- i exoadduktov.** I. N. Nazarov, V. F. Kucherov, and V. G. Bukharov. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 1, Jan. 1957, p. 91-99.

Condensation of cyclopentadiene with citraconic anhydride at 190-195 C forms a mixture of stereoisomeric endoanhydrides and exoanhydrides; after saponification, a 30% yield of exoacid can be obtained from them. Structure and configuration of γ-lactoacids.

8163 The Oxidation of Monoethenoid Fatty Acids and Esters. The Autoxidation Products of Erucic Acid and Its Methyl and *n*-Propyl Ester. J. H. Skellon and P. E. Taylor. *Journal of Applied Chemistry*, v. 7, Feb. 1957, p. 67-72.

Saponification of the oxidized esters gives acidic dimeric compounds which eventually break down to mixtures containing keto-hydroxy, unsaturated ketonic, and epoxy derivatives in addition to 13:14-dihydroxybehenic acid.

8164 9,10-Dihydro-9,10-Methanoanthracene and Its Perhydro Derivatives. Wyman R. Vaughan and Masao Yoshimine. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 7-13.

Preparation and properties. Ultra-violet spectra suggest interaction of nonadjacent (nonconjugated) chromophores.

8165 Olefinic Stability and Tautomeric Equilibria. I. Branched-Chain Unsaturated Esters. Kenneth L. Rinehart, Jr. and Lloyd J. Dolby. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 13-25.

The proportion of unconjugated olefin is shown to decrease with increasing branching in the γ-substituent.

8166 Reactions of Atoms and Free Radicals in Solution. XXXIX. The Reaction of Diacetyl Peroxide With *sec*-Butyl Nitrite and 3-Amyl Nitrite. M. S. Kharasch, Theodore H. Meltzer, and Walter Nudenberg. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 37-39.

8167 Some Monomeric Organosilicon Compounds of High Thermal Stability. Henry Gilman and Jack J. Goodman. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 45-47.

Some organic groups that impart high thermal stability are *p*-phenoxyphenyl, *m*-tolyl, *m*-trifluoromethylphenyl, and *p*-trimethylsilylphenyl. Molecules containing the 9-fluorenyl group were not promising in this respect.

8168 Effect of Structural Changes on Adsorption of Certain Alcohol 3,5-Dinitrobenzoates on Silicic Acid. John J. Bost, Richard E. Kepner, and A. Dinsmoor Webb. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 51-55.

The observed effects of changes in the alcohol side chains containing up to three C atoms, and of introducing various alkyl groups onto the aromatic nucleus, on the strength of adsorption of 3,5-dinitrobenzoate derivatives were evaluated in terms of electronic and steric factors.

8169 Comparison of *N*-Bromoacetamide and *N*-Bromosuccinimide as Brominating Agents. Robert E. Buckles, Robert C. Johnson, and William J. Probst. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 55-59.

N-Bromoacetamide showed more tendency toward addition and was the more reactive reagent. *N*-Bromodiacetimide, which closely resembles *N*-bromosuccinimide from the standpoint of electronic configuration but which is more like *N*-bromoacetamide from the standpoint of steric strain, was so reactive it could not be prepared pure.

8170 Synthesis of Higher Alkyltin Compounds From Sodium-Tin Alloys. Joseph R. Zietz, Jr., Sidney M. Blitzer, Horace E. Redman, and Gene C. Robinson. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 60-62.

N-Butyl chloride reacts with Na-Sn alloys at 150-180 C, resulting in 25-30% tin conversions to mixtures composed of 10-20% tetrabutyltin and 80-90% tributyltin chloride. *N*-Propyl chloride and *n*-amyl chloride react with NaSn (2% Zn) giving good conversions to the R_4Sn-R_3SnCl mixtures.

8171 Synthesis of DL-α-Amino-β-(1-Skatyl) Propionic Acid. S. Swaminathan and S. Ranganathan. *Journal of Organic Chemistry*, v. 22, Jan. 1957, p. 70-72.

Skatole undergoes the Mannich reaction with formalin and dimethylamine to give 1-dimethylaminomethylskatole. The methiodide of this base alkylates ethyl acetamidocyanoacetate. The alkylated product after treatment with alkali furnishes DL-α-amino-β-(1-skatyl) propionic acid.

8172 (Russian.) Synthesis of the Mixed Bis-Compounds of Aldehydes and Ketones. **Sinteza meshovitikh dijedinen'a aldekhida i ketona. II.** Synthesis of Aryliden Thio-Urethanes and Aryliden Thio-Amides. **Sinteza arilidentio-uretana i arilidentio-amida.** Ksenija Sirotanovic. *Khemiskog Drushtva Beograd, Glasnik*, v. 21, no. 4, 1956, p. 219-223.

8173* (German.) Reaction of Aromatic Etherdialdehyde With γ,γ'-Diaminodipropyl ether. **Über Umsetzungen aromatischer Ätherdialdehyde mit γ,γ'-Diaminodipropyläther.** Gerd Greber. *Makromolekulare Chemie*, v. 22, no. 3, 1957, p. 183-194.

The preparation of three etherdialdehydes starting from *p*-oxybenzaldehyde and various ω,ω'-dihalogeno compounds.

8174* (German.) Properties of Mixed Polyamides in Solutions and in Solids. **Über die Eigenschaften von Mischpolyamiden in Lösung und im festen Zustand.** Hans Batzer and Anton Möschle. *Makromolekulare Chemie*, v. 22, no. 3, 1957, p. 195-236.

Cocondensates of a different composition of adipic acid-hexamethylenediamine and ε-caprolactam were made and decomposed in fractions.

8175* Fatty Acyl Alkylolamides. I. Chemistry and Manufacture. K. R. Dutton and W. B. Reinisch. *Manufacturing Chemist*, v. 28, Mar. 1957, p. 124-127.

Types of alkylolamides and their use in foam stabilization.

8176 Mechanism of Organic Chemical Reactions. E. de Barry Barnett. 289 p. 1956. Blackie & Son, Ltd., London. (QD476 B26m)

Substitution reactions; lateral-nuclear migration; addition to double bonds; elimination and cyclization; molecular rearrangement; miscellaneous reactions not involving rearrangement; specific methods of oxidation, reduction, and halogenation.

8177* Indian Spearmint Oil. III. B. B. Ghatgey and S. C. Bhattacharyya. *Perfumery and Essential Oil Record*, v. 48, Feb. 1957, p. 62-67.

Structure of mintglyoxal was confirmed by conversion through cyclization and subsequent reactions to thymol.

8178* The Chemistry of the Perhydro-Azulene Sesquiterpenoids. II. P. de Mayo. *Perfumery and Essential Oil Record*, v. 48, Feb. 1957, p. 68-72.

Structural features of these compounds.

8179 Physical Methods of Organic Chemistry. v. I. Technique of Organic Chemistry. Arnold Weissberger, editor. 2nd Rev. Ed. Pt. I-II. 2096 p. 1949. Interscience Publishers, New York. (QD453 W44p2)

Tested methods for the determination of physical properties, theoretical background for understanding and handling them, and information necessary for critical evaluation of experimental results.

8180* The Pentacyclic Triterpenoids. D. E. White. *Reviews of Pure and Applied Chemistry*, v. 6, Dec. 1956, p. 191-248.

Preparation, structure, and characteristics of derivatives of oleanane, ursane, lupane, taraxastane, taraxerane, and friedelane.

8181 Technique of Organic Chemistry. v. III. Pt. II. Laboratory Engineering. Arnold Weissberger, editor. 2nd Rev. Ed. 391 p. 1957. Interscience Publishers, New York. (QD258 W44s2)

Selection of materials for the construction of equipment. Heating and cooling; grinding, screening, and classifying; mixing; operations with gases.

8182* (German.) Relation Between the Infra-Red Spectrum and the Constitution of Condensed Aromatics. **Zusammenhänge zwischen Infrarotspektrum und Konstitution von kondensierten Aromaten. II.** Anthracene, Anthrone, and

Anthraquinone Compounds. **Verbindungen des Anthracens, Anthrons und Anthrachinons.** Heinz Dannenberg and Arnljot Naerland. *Zeitschrift für Naturforschung*, v. 12b, Jan. 1957, p. 1-5.

See also: **7945** (preparation of substituted ureas); **8032** (hydrocarbon ignition temperature); **8088** (saturatal linear and branched fatty acids); **8293** (vinyl fatty acids); **8489** (syndets and soaps).

CHEMISTRY—PHYSICAL

8183 The Physical and Chemical Properties of the Methylhydroxylamines. T. C. Bissot, R. W. Parry, and D. H. Campbell. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 796-800.

Melting points, vapor pressures, and heats of vaporization.

8184 Extremely Slow Reactions. I. The Isotopic Exchange Reaction Between Iodobenzene and Potassium Iodide. P. J. Manno and W. H. Johnston. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 807-811.

Reaction was studied in a two-phase system using I^{131} over the ranges of 16 to 46 C and 10^{-4} to 10^{-1} *f* KI. Apparent activation energies were 10.7 and 3.7 kcal. per mole in the heterogeneous and homogeneous regions, respectively.

8185 Decomposition of Ethylene in an Electric Discharge. M. Prakasa Reddy and Milton Burton. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 813-820.

8186 The Photolysis of Ketene at Low Pressure. Gerald B. Porter. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 827-828.

Apparent quantum yields of CO and ethylene were determined at wave length 3650 A. as functions of temperature and concentration of ketene.

8187 Kinetics of the Thiol-Disulfide Exchange. Antonino Fava, Antonio Iliceto, and Ettore Camera. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 833-838.

8188 Organic Ions in the Gas Phase. II. The Tropylium Ion. Paul N. Rylander, Seymour Meyerson, and Henry M. Grubb. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 842-846.

The mass spectra of labeled ethylbenzenes and toluenes suggest that dissociation of these compounds involves a rearrangement to produce, not the benzyl ion, but the isomeric tropylium ion.

8189 Study of the Interaction Between Hydroxyl Groups of Aerosil Silica and Adsorbed Non-Polar Molecules by Infrared Spectrometry. R. S. McDonald. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 850-854.

8190 The Solubility of Water in Aromatic Halides. James Wing and W. H. Johnston. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 864-865.

Solubilities in benzene, toluene, fluorobenzene, chlorobenzene, bromobenzene, iodobenzene, and *o*-dichlorobenzene were measured by an isotopic dilution technique using tritiated water as the tracer and counting as acetylene.

8191 Polarography in Acetonitrile. I. Metal Ions Which Have Comparable Polarographic Properties in Acetonitrile and in Water. I. M. Kolthoff and J. F. Coetzee. *American Chemical Society, Journal*, v. 79, Feb. 20, 1957, p. 870-874.

Polarographic characteristics of Cd, Zn, and alkali and alkaline earth metal ions.

8192 Kinetics of the Manganate-Permanganate Exchange Reaction. John C. Sheppard and Arthur C. Wahl. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1020-1024.

8193 Activity Coefficients in Aqueous Zinc Chloride-Hydrochloric Acid Solutions, and Their Application to Cation Exchange Data. Norman J. Meyer, William J. Argersinger, Jr., and Arthur W. Davidson. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1024-1028.

Data on exchange of Zn and H ions on Dowex 50 at 25 C.

8194 Graphite Compounds. Marceline L. Dzurus and Gerhart R. Hennig. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1051-1054.

The systems Cl_2-$AlCl_3$-graphite, Br_2-$AlCl_3$-graphite, I_2-$AlCl_3$-graphite, $FeCl_3$-$AlCl_3$-graphite, and $FeCl_3$-graphite were examined.

8195 1-Butanethiol and 2-Thiapentane. Experimental Thermodynamic Studies Between 12 and 500 K; Thermodynamic Functions by a Refined Method of Increments. D. W. Scott, H. L. Finke, J. P. McCullough, J. F. Messerly, R. E. Pennington, I. A. Hossenlopp, and Guy Waddington. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1062-1068.

8196 The Kinetics of Hydrolysis of Scopolamine Derivatives With an Unusual Elimination on Alkaline Hydrolysis. Edward R. Garrett. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1071-1076.

8197 The Mechanism of Exchange of Hydrogen Between Ammonium and Hydroxyl Groups. I-II. C. Gardner Swain, Mortimer M. Labes, James T. McKnight, and V. Peter Kreiter. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1084-1093.

Mechanism involves termolecular formation of a hydrogen-bonded ammonia-alcohol complex, dissociation of this intermediate to free ammonia and alcohol and return through the reverse of these two steps.

8198 The Dissociation Constants of Some Dihalides of Dimethyl Sulfide and Dimethyl Selenide in Carbon Tetrachloride Solution. N. W. Tideswell and J. D. McCullough. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1031-1033.

8199 The Distribution of Iodine Between Carbon Tetrachloride and Water and a Proposed Mechanism for Dilute, Aqueous Iodine Reactions. Raymond G. Wille and Mary L. Good. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1040-1043.

8200 A Precise Correlation of Nuclear Magnetic Shielding in *m*- and *p*-Substituted Fluorobenzenes by Inductive and Resonance Parameters From Reactivity. Robert W. Taft, Jr. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1045-1049.

8201 Mechanism of Racemization of Complex Ions. III. Effect of Added Ions Upon the Rates of Dissociation of Tris-(1,10-Phenanthroline)-Iron(II) and Tris-(1,10-Phenanthroline)-Iron(III) and Upon the Rate of Racemization of Tris-(1,10-Phenanthroline)-Iron(III). John E. Dickens, Fred Basolo, and H. M. Neumann. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1286-1290.

8202 Chemical Equilibria in the Gaseous System Bromine-Bromine Trifluoride-Bromine Monofluoride. Robert K. Steunenberg, Richard C. Vogel, and Jack Fischer. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1320-1323.

8203 Interpretation of Data for Concentration-Dependent Free Diffusion in Two-Component Systems. Louis J. Gosting and Hiroshi Fujita. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1359-1366.

A formal series solution of the second Fick equation with a concentration-dependent diffusion coefficient is obtained for one-dimensional free diffusion in two-component systems by making use of the method of successive approximations.

8204 A Potentiometric Study of the Change in Iodine Binding Capacity of Amylose While Retrograding in Dilute Solution. Frank A. Loewus and D. R. Briggs. *American Chemical Society, Journal*, v. 79, Mar. 20, 1957, p. 1494-1497.

8205 The Absolute Infrared Absorption Band Intensities of the Methylene Group Vibrations of Some Methylene Halides. Richard Hedges and Harrison Shull. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-672, Aug. 1955, 36 p. (UF767 Un3.1is Contin.)

8206* (German.) Short-Lived Radicals as Intermediate Products. **Kurzlebige Radikale als Zwischenprodukte.** St. Goldschmidt. *Angewandte Chemie*, v. 69, Feb. 21, 1957, p. 132-135.

The formation of radicals by electrolysis is compared with that caused by the decomposition of peroxide.

8207* (German.) Photochemical Phenomena in Sensitized AgCl-Crystals for Temperatures From −185°C to +20°C. **Photochemische Erscheinungen insensibilisierten AgCl-Kristallen für den Temperaturbereich von −185°C bis +20°C.** Alfred Scholz. *Annalen der Physik*, v. 19, Dec. 1956, p. 175-202.

Between −180 to −120 C, a distinct band for the long wave absorption was obtained, and near −60 C an infra-red absorption crest appeared. The photochemical absorption centers were assumed to be molecular complexes and volume effects were the determining factors in the photochemical process.

8208* (German.) Photochemistry of Sensitized Silver Halide Crystals. **Photochemie in sensibilisierten Silberhalogenidkristallen.** Christian Volke. *Annalen der Physik*, v. 19, Dec. 1956, p. 203-228.

A study, with visible light and low temperatures, of the behavior of silver halide crystals having atomically dispersed bivalent anions of S, Se, and Te.

8209* (French.) A Simultaneous Study of the Vibration Spectra of Dioxan-1,4 Mercury Chloride and the Dioxan-$HgCl_2$ Complex. **Étude comparée des spectres de vibration du dioxanne 1.4, du chlorure mercurique, et du complexe dioxanne-$HgCl_2$.** Pierre Tarte and Pierre A. Laurent. *Bulletin de la Société Chimique de France*, no. 3, Mar. 1957, p. 403-406.

Raman and infra-red spectra of the addition compound $HgCl_2 \cdot C_4H_8O_2$.

8210* (French.) Using Infra-Red Spectroscopy to Determine Hydrogen Bonds in Connection With the Vibrator "SH". **Détermination par spectroscopie infrarouge de liaisons hydrogène intéressant le vibrateur SH. I.** Benzenethiol. **Le benzènethiol.** Marie-Louise Josien, Pierre Dizabo, and Pierre Saumagne. *Bulletin de la Société Chimique de France*, no. 3, Mar. 1957, p. 423-428.

The ability of S to form H bonds with itself, with O, halogens, and benzene nuclei was confirmed. Critical survey of previous investigations.

8211 Anomalous Apparent Dielectric Constants of Gases of Several Porous Adsorbents. S. E. Petrie and R. McIntosh. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 183-190.

Changes in capacity of a test cell which contained porous Vycor glass were measured following the adsorption of butane and ethyl chloride. A sudden drop in the apparent polarization was observed at a well-defined quantity of adsorbed gas. Attempts to explain the phenomena proved only partially successful.

8212 The Entropies of Ions in Aqueous Solution. II. An Empirical Equation for Oxy-Anions. A. M. Couture and K. J. Laidler. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 202-206.

8213 Nuclear Magnetic Resonance Measurements of Complexes of Chloroform With Aromatic Molecules and Olefins. L. W. Reeves and W. G. Schneider. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 251-261.

The proton resonance signal of chloroform in the aromatic solvents benzene, toluene, mesitylene, chlorobenzene, *o*-dichlorobenzene, bromobenzene, nitrobenzene, and in the olefinic solvents 1-hexene, cyclohexene, and cyclohexadiene was measured as a function of concentration. The observed shifts of the resonance signal are indicative of specific complex formation.

8214 The Configuration of Glycosidic Linkages in Oligosaccharides. III. *O*-α-D-Mannopyranosyl-(1→2)-*O*-α-D-Mannopyranosyl-(1→2)-D-Mannose. P. A. J. Gorin and A. S. Perlin. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 262-267.

8215 The Second Virial Coefficient of Carbon Dioxide at Low Temperatures. D. Cook. *Canadian Journal of Chemistry*, v. 35, Mar. 1957, p. 268-275.

The fixed volume expansion method for gas compressibility measurements previously employed under conditions of high temperature and high pressure has now been developed for low temperature and low pressure measurements. Measurements in the temperature range −60 C to +30 C, and in the pressure range 0.5 to 2.5 atm. are reported.

8216 On the Production of Single Crystals of Naththalene and Anthracene. F. R. Lipsett. *Canadian Journal of Physics*, v. 35, Mar. 1957, p. 284-298.

Furnaces for the growth of crystals from the melt by the Bridgman method; polishing technique; orientation; growth of anthracene crystals from solution in N,N-dimethylformamide.

8217 Vapor-Liquid Equilibrium Data for System: *n*-Octane-Propionic Acid, With Salt Effect. A. I. Johnson, D. M. Ward, and W. F. Furter. *Canadian Journal of Technology*, v. 43, Mar. 1957, p. 514-518.

Sodium propionate was found to enhance the relative volatility and alter the azeotropic composition of the binary system in the manner predicted of the system.

8218 The Selective Behavior of Ion-Exchange Membranes at High Concentrations. G. G. Madgwick. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 97-104.

Shows that a three compartment cell, operating under special conditions, may demonstrate the true selectivity of the membranes.

8219 The Kinetic Implications of an Empirically Fitted Yield Surface for the Vapor-Phase Oxidation of Naphthalene to Phthalic Anhydride. P. H. Pinchbeck. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 105-111.

The significance of various aspects of this surface are considered in relation to the reaction kinetics.

8220 Fugacities in Simple Gas Mixtures. John M. Prausnitz. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 112-115.

Method is based on an extension of the theorem of corresponding states and is applicable to multicomponent mixtures of simple gases at moderate densities.

8221 Compressibility, Fugacity, and Water-Solubility of Carbon Dioxide in the Region 0-36 atm. and 0-100°C. G. Houghton, A. M. McLean, and P. D. Ritchie. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 132-137.

An improved form of the Beattie volume-explicit equation. Data are tabulated.

8222 Nucleophilic Displacement Reactions in Aromatic Systems. VI. Influence of Nuclear Alkyl Groups in the Aromatic System. Kinetics of the Reactions of Chlorodinitrotoluenes and Related Compounds With Piperidine, Aniline, and Ethoxide Ions in Ethanol, and With Methoxide Ions in Methanol. B. Capon and N. B. Chapman. *Chemical Society, Journal*, Feb. 1957, p. 600-609.

8223 Conductimetric Studies in Ketonic Solvents. III. Alkali Iodides and Salicylates in Ethyl Methyl Ketone and Acetophenone. S. R. C. Hughes. *Chemical Society, Journal*, Feb. 1957, p. 634-638.

Comparison of data for alkali-metal iodides in dry ketonic media gives little support to the idea that their cations are desolvated by coulombic association, but the contrasting behavior of alkali-metal salicylates in these solvents requires the presumption of considerable cation desolvation.

8224 Colour and Constitution. I. The Effect of Methyl Substitution on the Ultraviolet Spectra of Alternant Hydrocarbons. David Peters. *Chemical Society, Journal*, Feb. 1957, p. 646-651.

The Hückel L.C.A.O. molecular-orbital theory is shown to provide a satisfactory quantitative account of the bathochromic shifts observed in the ultra-violet spectrum when a methyl group is introduced into alternant hydrocarbons.

8225 Complex Fluorides. VIII. The Preparation and Properties of Salts of the Triphenylmethyl Cation. The Infrared Spectrum and Configuration of the Ion. D. W. A. Sharp and N. Sheppard. *Chemical Society, Journal*, Feb. 1957, p. 674-682.

8226 A Conductimetric Study of Acid-Base Interactions in Non-Aqueous Media. P. J. R. Bryant and A. W. H. Wardrop. *Chemical Society, Journal*, Feb. 1957, p. 895-906.

The conductimetric titration technique was extended in order to study interactions between organic acids and tertiary bases in acetone and acetonitrile. Various conductance curves are interpreted in terms of the ionic species present in solution.

8227* (German.) Organic Catalysts. **Organische Katalysatoren. XLV.** Catalytical Effect of o-Quinone. **Katalytische Wirkungen von o-Chinonen.** Heinz Cassebaum and Wolfgang Langenbeck. *Chemische Berichte*, v. 90, no. 3, 1957, p. 339-346.

Describes catalytic abilities of dinaphthyl-(1,1')-quinones.

8228* (French.) Analytical Ultracentrifuging Techniques Used in Measuring Molecular Masses. **Techniques analytiques d'ultracentrifugation utilisées pour la mesure des masses moléculaires.** L. Nicolas. *Chimie Analytique*, v. 39, Mar. 1957, p. 81-93.

Technique can be used either in observing the speed of sedimentation or the equilibrium of sedimentation. Theoretical explanation of both methods. Description of apparatus used and possible applications.

8229* (French.) A Thermodynamic Study of a Lead Nitrate Solution in Melted Potassium Nitrate. **Étude thermodynamique d'une solution de nitrate de plomb dans le nitrate de potassium fondu.** Yves Doucet and Christian Janot. *Comptes Rendus*, v. 244, Feb. 25, 1957, p. 1166-1169.

Tested with a cryometer, the solution showed a negative deviation from Raoult's law. Very little heat was emitted during the mixing.

8230* (French.) Nitrogen Absorption Spectrum in Extreme Ultra-Violet. **Sur le spectre d'absorption de l'azote dans l'ultraviolet extrême.** Nicole Astoin and Janine Granier. *Comptes Rendus*, v. 244, Mar. 4, 1957, p. 1350-1353.

The absorption spectrum of gaseous N was studied between 150 and 1000 Å. Several continuous spectra were observed ascribable to ionization or dissociation.

8231 Charge Displacement in Substituted Paraffins. H. Yoshizumi. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 125-131.

8232 Statistical Thermodynamics of Concentrated Colloidal Solutions. I. Free Energy of Electrical Double Layers. G. M. Bell and S. Levine. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 143-158.

8233 The Dipole Moments and Molecular Structure of Substituted Acetamides. Sundaresa Soundararajan. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 159-166.

8234 Thermal Diffusion in Non-Isothermal Cells. I. Theoretical Relations and Experiments on Solutions of Thallous Salts. II. Experiments on Solutions of Cadmium Salts. J. N. Agar and W. G. Breck. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 167-184.

Changes of e.m.f. due to thermal diffusion were measured.

8235 Thermal Transpiration: Application of Liang's Equation. M. J. Bennett and F. C. Tompkins. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 185-192.

Thermal transpiration data for CO, CO_2, and O.

8236 Further Observations on the Decomposition of Solid Sodium Azide by X-Rays. H. G. Heal. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 210-217.

The behavior of irradiated sodium azide on dissolution in liquid ammonia, and in aqueous mercuric chloride solution, shows that the azide ions have decomposed mainly to molecular nitrogen and electrons, and little, if at all, to nitride ions. Effect of temperature on the decomposition rate between −186 and +202 C is described.

8237 Chemisorption of Gases on Nickel Films. II. Equilibrium Studies. P. M. Gundry and F. C. Tompkins. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 218-228.

Equilibrium properties of the H-Ni and CO-Ni systems.

8238* (Russian.) Determination of Specific Surface Areas of Catalysts Under Flow Conditions by Means of One Adsorption Equilibrium Point Measurement. **Opredelenie velichiny udel'noi poverkhnosti katalizatorov v dinamicheskikh usloviiakh po odnomu adsorbtsionnomu ravnovesiiu.** A. M. Rubinshtein, A. A. Slinkin, and V. A. Afanas'ev. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 1, Jan. 1957, p. 32-36.

Theoretical basis and construction details of device for making these measurements. The apparatus may be used for determining low-temperature adsorption of benzene vapors at room temperature.

8239 Relations Between Molecular Structure and Photodecomposition Modes. James N. Pitts, Jr. *Journal of Chemical Education*, v. 34, Mar. 1957, p. 112-121.

Experimental techniques used in photochemistry. Effect of side chain structure on the primary photodecomposition modes of methyl ketones and aliphatic aldehydes.

8240 The Study of Free Radical Reactions Through Photochemistry. Harry E. Gunning. *Journal of Chemical Education*, v. 34, Mar. 1957, p. 121-126.

8241 Infrared Absorption Spectra of Urea, Thiourea, and Some Thiourea-Alkali Halide Complexes. James E. Stewart. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 248-254.

Spectra of complexes with CsBr, KI, KBr, NaBr, and NaI were observed from 3 to 40μ.

8242 Heat Transfer in Chemically Reacting Mixtures. I. Joseph O. Hirschfelder. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 274-281.

Mathematical analysis of a mixture confined between two parallel plates, one hot and the other cold.

8243 Light-Scattering and Color Centers in Sodium Cyanide. Giovanni Isetti and Theodore J. Neubert. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 337-344.

For crystals measured at room temperature the optical density varies with the inverse fourth power of wavelength, thus indicating the presence of light-scattering centers small in extent compared to the wavelength of light. It is suggested that the scattering centers are small regions of rhombohedral phase embedded in the face-centered cubic phase usually observed at room temperature.

8244 Zeeman Effect on the Quadrupole Spectrum of Iodic Acid. Ralph Livingston and Henry Zeldes. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 351-358.

The pure quadrupole spectrum of I^{127} in iodic acid was observed at four temperatures between −196 and 22 C.

8245 Thermoelectric Behavior of Solid Particulate Systems. Nickel Oxide. G. Parravano and C. A. Domenicali. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 359-366.

Thermoelectric power measurements were performed on powdered NiO in the temperature range 60 to 220 C, under atmospheres of O_2, H_2, CO, CO_2, N_2O, He, and water vapor at different partial pressures.

8246 Microwave Dielectric Measurements in Liquid Crystals. E. F. Carr. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 420-422.

The real and imaginary parts of the complex dielectric constant of the liquid crystal and normal liquid phases of anisaldazine and a mixture of *p*-azoxyanisole and *p*-azoxphenetole were measured at a frequency of 14,400 Mc.

8247 (French.) The Role of Superficial Carburation in Organic Vapor Reactions on the Surface of Tungsten. (The Example of Acetaldehyde). **Role de la carburation superficielle dans les réactions de vapeurs organiques a la surface du tungstène. (L'exemple de l'acétaldéhyde).** P. Le Goff and M. Letort. *Journal de Chimie Physique*, v. 54, Jan. 1957, p. 3-14.

The decomposition and oxidation on W of acetaldehyde at very low pressure and under dynamic conditions were studied on the basis of surface contamination by C, C diffusion in W, and the two elementary reactions of the atomic O film.

8248 (French.) The Interaction Between the Surface of a Transparent Nickel Film, Obtained by Evaporation, and the Adsorbed Xenon Films. **Sur l'interaction entre la surface d'un film transparent de nickel obtenu par évaporation et les atomes de xénon adsorbés.** R. Suhrmann, E. A. Dierk, B. Engelke, H. Hermann, and K. Schulz. *Journal de Chimie Physique*, v. 54, Jan. 1957, p. 15-18.

The photoelectric method was used to measure the variation of the work done in extracting electrons and the variation of the electric resistance during the adsorption of the Xe film under low pressure and at low temperature.

8249 (French.) Adsorption of Atoms and Molecules of Hydrogen on Platinum. **L'adsorption des atomes et des molécules d'hydrogène sur le platine.** J. C. P. Mignolet. *Journal de Chimie Physique*, v. 54, Jan. 1957, p. 19-25.

The study was performed at −190 and 20 C, by measuring the surface potential. Lightly concentrated films were essentially

atomic. Their surface potential was negative. In very concentrated films H was fixed first in molecular form.

8250 Deviations From Strict Heteropolarity in Crystalline Halides of Divalent Elements. D. F. C. Morris. *Journal of Inorganic and Nuclear Chemistry*, v. 4, Feb. 1957, p. 8-12.

Differences between the experimental and theoretical crystal energies can be correlated with deviations from strict heteropolarity suggested from ionization potentials and anionic polarizabilities.

8251 Conductimetric Study of the Reactions Between Metal Halides and Lithium Aluminium Hydride. I. Aluminium Chloride. Gordon G. Evans, J. Kevin Kennedy, Jr., and Frank P. Del Greco. **II. Aluminium Iodide.** Gordon G. Evans and Frank P. Del Greco. *Journal of Inorganic and Nuclear Chemistry*, v. 4, Feb. 1957, p. 40-54.

8252 Ultraviolet and Visible Absorption Spectra of Metal Chelates of Bisacetylacetoneethylenediimine and Related Compounds. Keihei Ueno and Arthur E. Martell. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 257-261.

8253 The Heats of Combustion of Substituted Triazoles, Tetrazoles and Related High Nitrogen Compounds. Mary M. Williams, William S. McEwan, and Ronald A. Henry. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 261-267.

Data on 36 compounds. The number of moles of HNO_3 formed during the combustion process was found to be a function of the square root of the product of the heat of combustion and the number of N atoms present. Several new tetrazole compounds are described.

8254 Analysis of Structure in Channel Black Dispersions. Andries Voet. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 301-309.

Electrical methods were used to determine conductivity, dielectric constant, hysteresis phenomena, and rheological properties.

8255 Dielectric Properties of Aqueous Ionic Solutions at Microwave Frequencies. Frank E. Harris and Chester T. O'Konski. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 310-319.

Densities, audiofrequency conductivities, dielectric constants, and loss factors of a number of solutions were measured at 25 C and at concentrations ranging from 0.5 *M* to saturation.

8256 Vapor Pressure and Derived Information of the Sodium Fluoride-Zirconium Fluoride System. Description of a Method for the Determination of Molecular Complexes Present in the Vapor Phase. Karl A. Sense, C. A. Alexander, R. E. Bowman, and R. B. Filbert, Jr. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 337-344.

Vapor pressures over the range 599-1075 C were measured using the transpiration method. In addition to NaF and ZrF_4, a compound with the simple structure $NaZrF_5$ is indicated in the vapor phase. A phase diagram of the NaF-ZrF_4 system and an activity plot of the system NaF-$NaZrF_5$ suggest the existence of Na_3ZrF_7 in the liquid state.

8257 Vapor Pressure Studies Involving Solutions in Light and Heavy Waters. III. The Separation Factor for the Isotopes of Hydrogen During Distillation From Salt Solutions in the Mixed Waters at Room Temperature. John M. Googin and Hilton A. Smith. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 345-350.

There is little possibility of improving the separation by additions to the water phase at room temperature.

8258 Salting-Out Chromatography. I. Alcohols. Roger Sargent and William Rieman, III. *Journal of Physical Chemistry*, v. 61, Mar. 1957, p. 354-358.

Variables such as the functional group, mesh size and cross-linkage of the resin, sample size, and flow rate were studied with several alcohols as solutes.

8259 Determination of the Vapour Pressure of Ethylene Dibromide. F. Call. *Journal of the Science of Food and Agriculture*, v. 8, Feb. 1957, p. 81-85.

8260 (Russian.) Experimental Investigation of the Influence of the Composition of Solutions and Solvents on the Polarization Process at the Dropping Mercury Electrode. **Eksperimentalno ispitivan'e utitsaia sastava rastvora i rastvarcha na mekhanizam elektrokhemiiskikh promena na kapl'uchoj zhivinoj elektrodi. I.** Change of the Electrocapillarity in Mixtures of 1,4-Dioxane-H_2O and 1,4-Dioxane-H_2O-HCl. **Promena elektrokapilariteta u sistemu 1,4-dioksan-voda i 1,4-dioksan-voda-khlorovodonik. II.** Overvoltage and Liberation of Hydrogen in Mixtures of 1,4-Dioxane-H_2O and 1,4-Dioxane-H_2O-HCl. **Potentsijal izdvajan'a i prenapetost vodonika u sistemu 1,4-dioksan-voda i 1,4-dioksan-voda-khlorovodonik.** Panče Kirkov, Divna Konstantinova-Taškovska, Nada Čumbelić-Gigova, and Aleksandra Vilarova-Babamova. *Khemiskog Drushtva Beograd, Glasnik*, v. 21, no. 3, 1956, p. 129-150.

8261 The Lithium Hydride, Deuteride, and Tritide Systems. F. K. Heumann and O. N. Salmon. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1667, Dec. 1956, 54 p. (UF767 Un3.1ka Contin.)

Pressure-composition isotherms for LiH, LiD, and LiT at 700 C, and for LiD and LiT at 750 and 800 C. Immiscibility loops; heats of formation.

8262* (English.) **Finely Divided Solids as Emulsifiers. III. Emulsions Stabilised by Miscellaneous Solids.** L. N. Mukerjee and S. N. Srivastava. *Kolloid-Zeitschrift*, v. 150, Feb. 1957, p. 144-148.

Bentonite, carbonates, sulphates, sulphides, oxychlorides, phosphates, arsenates, and arsenites of metals were examined as emulsifying agents. Carbonates are good, and the arsenates and arsenites of Ca and Al are very good agents.

8263* (English.) **Bordeaux Mixture and Related Compounds as Emulsifiers.** L. N. Mukerjee and S. N. Srivastava. *Kolloid-Zeitschrift*, v. 150, Feb. 1957, p. 148-151.

8264* (Russian.) X-Ray Investigation of the System $PbTiO_3$-$PbSnO_3$. **Rentgenograficheskoe issledovanie sistemy $PbTiO_3$-$PbSnO_3$.** Iu. N. Venevtsev, G. S. Zhdanov, and T. N. Shendrik. *Kristallografiia*, v. 1, no. 6, 1956, p. 657-665.

Determined the presence of solid solution $Pb(Ti,Sn)O_3$ up to 75 mol.% $PbSnO_3$. Proof of the difference between electrical polarization of $BaTiO_3$ and $PbTiO_3$.

8265* (Russian.) Crystalline Structure of Tetraphenyl-Phosphonium Iodide and the Configuration of the Tetraaryl Ions and Molecules. **Kristallicheskaia struktura iodida tetrafenilfosfoniia i konfiguratsiia tetraaril'nykh ionov i molekul.** T. L. Khotsianova and Iu. T. Struchkov. *Kristallografiia*, v. 1, no. 6, 1956, p. 669-676.

Determined the structure of tetraphenyl phosphonium iodide by calculating the three-dimensional series of interatomic vectors.

8266* Iodine as a Catalyst. *Manufacturing Chemist*, v. 28, Feb. 1957, p. 76.

Iodine and its compounds are valuable as catalysts in the synthesis of drugs and fine chemicals such as alkoxy acetals, anti-rheumatic compounds, antimalarials, trypanocides, coumarin, and vitamins.

8267 A Review of the Reaction Kinetics of Deuterium and Tritium Compounds. VII. Oxidation-Reduction Reactions. Lawrence M. Brown. *National Bureau of Standards (U. S. Atomic Energy Commission)*, NBS-4877, Nov. 1956, 25 p. (UF767 Un3.1nb Contin.)

A review of the literature for the period 1932 to 1955. Fifty-two references are cited.

8268 Structure of Silver Iodide Dibenzoate. I. R. Beattie and D. Bryce-Smith. *Nature*, v. 179, Mar. 16, 1957, p. 577-578.

Silver iodide dibenzoate free from AgI was obtained by utilizing the solubility of the former in dimethylformamide.

8269 The Specific Heat of Liquid Helium. R. W. Hill and O. V. Lounasmaa. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 143-148.

Measurements between 1.8 and 5.05 K.

8270 The Surface Energies of Amorphous Silica and Hydrous Amorphous Silica. Stephen Brunauer, D. L. Kantro, and C. H. Weise. *Portland Cement Association Research Department Bulletin* 76, Oct. 1956, p. 1483-1496. (TP883 P836 Vis.)

The values found at 23 C were 25± 3 ergs per sq. cm. for amorphous silica of zero water content, and 129 ± 8 ergs per sq. cm. for hydrous amorphous silica with a completely hydrated surface.

8271 Volume Change on Melting of N_2 up to 3500 kg/cm. E. R. Grilly and R. L. Mills. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1140-1145.

8272 Spectra of Halogen Solutions and *V* Bands in Alkali Halides. Herbert N. Hersh. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1410-1411.

Ultra-violet spectra of iodine dissolved in crystalline KI and in aqueous KI and CsI solutions. Comparison of *V* bands and halogen bands.

8273 The Behaviour of the Paramagnetic Ions in the Single Crystals of Some Similar Salts of the Iron Group of Elements. I. Hydrated Cupric Salts. A. Bose, S. C. Mitra, and Sunil K. Datta. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 165-183.

8274 The Heat Capacities of Certain Liquids. D. Harrison and E. A. Moelwyn-Hughes. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 230-246.

Heat capacities and adiabatic compressibilities of CCl_4 $CHCl_3$, CH_2Br_2, and CHI between −30 and 30 C. Effect of change of volume on the heat capacity at constant volume for Hg, CS_2, CCl_4, $CHCl_3$ and water.

8275 The Study of Crystal Growth With the Electron Microscope. V. The Crystal Growth of *n*-Pentacontanol-1. I. M. Dawson and D. H. Watson. *Royal Society, Proceedings*, v. 239, ser. A, Mar. 12, 1957, p. 349-364 + 2 plates.

In general, crystals grown from polar solvents showed monomolecular growth steps, and crystals grown from nonpolar solvents showed a high proportion of bimolecular growth steps with some monomolecular ones.

8276 Separation of Hydrocarbon Isomers by Thermal Diffusion. C. J. Danby, J. D. Lambert, and C. M. Mitchell. *Royal Society, Proceedings*, v. 239, ser. A, Mar. 12, 1957, p. 365-372.

Binary mixtures of *n*-pentane with *neo*-pentane, *iso*-pentane with *neo*-pentane, *n*-pentane with *iso*-pentane, and *n*-butane with *iso*-butane showed a marked degree of separation. In each case the former component concentrated in the cold zone.

8277 Dissociation of Molecular Hydrogen Ions (H^+_2) in Gases. K. K. Damodaran. *Royal Society, Proceedings*, v. 239, ser. A, Mar. 12, 1957, p. 382-393.

Cross-sections for the dissociation of 200 k.e.v. H^+_2 ions in H_2, D_2, He, N_2, O_2, Ne, A, Kr, Xe, CH_4, H_2S, CO_2, and N_2O; also at 175, 150, and 100 k.e.v. for H_2 and He and at 150 k.e.v. for N_2 and A.

8278* (English.) **Effect of Electric Field on the Phase Transition of Ammonium Sulfate.** Kan-ichi Kamiyoshi. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, Feb. 1957, p. 84-90.

Measurement of temperature variation of the dielectric constant shows that a d.c. electric field shifts the transition temperature of $(NH_4)_2SO_4$ either to higher or lower temperatures, according to previous heat treatment of the specimen.

8279* Tables of Chemical Kinetics. Homogeneous Reactions. Suppl. I. 472 p. 1956. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QD65 Un3t)

This supplement to the 1951 publication gives comprehensive and critical coverage of recent work involving rearrangement or isomerization, condensation, and solvolysis.

8280 The Crystal Structure of Acetic Acid. Robert E. Jones. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3641, Dec. 1956, 19 p. (UF767 U3u Contin.)

Structure was determined using X-ray diffraction techniques and a least squares method of refinement.

8281 Study of Chemical Relaxation Behind Shock Waves. M. Steinberg and T. F. Lyon. *Wright Air Development Center, Aeronautical Research Laboratory, WADC Technical Report* 56-394, 1957, 18 p. (TL507 Un3.18w Vis.)

The dissociation of nitric oxide behind shock waves in the range of 2000 to 4000 K by spectrophotometric means is being studied in the shock tube apparatus described.

8282* (German.) The Crystal Structure of Titanium Sulfide. **Zur Kristallstruktur der Titansulfide.** Harry Hahn and Bernhard Harder. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 288, Dec. 1956, p. 241-256.

8283* (German.) The Structure of $CuTi_2S_4$. **Über die Struktur des $CuTi_2S_4$.** Harry Hahn and Bernhard Harder. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 288, Dec. 1956, p. 257-259.

8284* (German.) Transformations of Titanium Sulfides With Bivalent Transition-Metal Sulfides. **Versuche zur Umsetzung von Titansulfiden mit Sulfiden Zweiwertiger Übergangsmetalle.** Harry Hahn, Bernhard Harder, and Wolfgang Brockmüller. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 288, Dec. 1956, p. 260-268.

Studies of the systems FeS-TiS-TiS_2, CoS-TiS-TiS_2, and NiS-TiS-TiS_2.

8285* (German.) Preparation of Thioperovskites. **Versuche zur Darstellung von Thioperowskiten.** Harry Hahn and Ursula Mutschke. *Zeitschrift für Anorganische und Allgemeine Chemie*, v. 288, Dec. 1956, p. 269-278.

Preparation, structure, and properties of $SrTiS_3$, $BaTiS_3$, and $BaZrS_3$.

See also: **8031** (thermal conductivity of tar fractions); **8162** (stereochemistry of cyclic compounds); **8166** (free radical reactions); **8175** (foam stabilizers); **8176** (mechanism of organic reactions); **8179** (physical techniques in organic chemistry); **8400** (ions in colloidal solutions); **8727** (reaction between Zr and H_2O).

COATINGS

8286 Characteristics of Refractory Oxide Coatings Produced by Flame-Spraying. Neil N. Ault. *American Ceramic Society, Journal*, v. 40, Mar. 1957, p. 69-74.

Specific data such as phases present, density, porosity, thermal expansion, thermal stability, and mechanical properties for coatings made from rods of alumina, zirconia, and zircon.

8287 "High Polymer Alkyd Technique." William M. Kraft, George T. Roberts, Edward G. Janusz, and Joseph Weisfeld. *American Paint Journal*, v. 41, Mar. 25, 1957, p. 96 + 12 pages.

Technique involves the formation of a greater proportion of high mol. wt. alkyd fractions by a stepwise esterification of the fatty acid in the alkyd formulation. Advantages include high viscosity, lighter resin colors, better flexibility, adhesion, freedom from baking discoloration, and detergent resistance.

8288 Highly-Conducting Gold Films Prepared by Vacuum Evaporation. A. E. Ennos. *British Journal of Applied Physics*, v. 8, Mar. 1957, p. 113-117.

It is possible to make highly conducting transparent films by vacuum evaporation on to thin layers of various metal oxides. The evaporated layers are strong and of high current-carrying capacity down to 30 A. thickness. Conductivity approaches the bulk value for annealed films thicker than 60 A.

8289 Polyvinylidene Chloride Film and Microcrystalline Wax for Protecting Underground Pipe. Ted Kennedy, Jr. *Corrosion*, v. 13, Mar. 1957, p. 186t-190t.

Microcrystalline wax of high quality appears to be a superior wetting agent, and when wrapped with a protective film of polyvinylidene chloride, will thoroughly and permanently protect a pipe surface from corrosion where properly applied.

8290 Protective Coatings for Atmospheric Use. Their Surface Preparation and Application Requirements, Physical Characteristics and Resistances. *Corrosion*, v. 13, Mar. 1957, p. 215t-223t.

The information given pertains primarily to the use of coatings for the protection of steel as used in bridges, tanks, towers, fences, and railroad cars exposed to rural, industrial, and marine atmospheres. Materials discussed include drying oil paints, ester gum-oil, phenolic oil varnishes, alkyd varnishes, epoxies, chlorinated rubber, vinyls, metallic silicate (zinc loaded), and coal tar and asphalt coatings. Tables show recommended surface

preparation, number of coats, approximate dried film thickness of each coat, approximate air-drying time before recoating, usual method of application, application surface temperature, thinners, general flammability classifications, compatibility with other types, abrasion resistance, gloss retention, resistance to petroleum oil and grease, maximum temperature limitations, approximate storage life under normal conditions, and health hazards.

8291 Plastics and the Corrosion of Iron and Steel. G. A. Curson. *Corrosion Technology*, v. 4, Mar. 1957, p. 79-82.

Application techniques and coating properties of materials such as polythene, nylon, Thiokol, shellac, Araldite, and Epikote resins.

8292* (German.) A Calorimetric Method for Measurement of the Siccative Effect. **Über ein kalorimetrisches Verfahren zur Messung der Trockenstoff-Wirkung.** J. Morgner and W. Sutor. *Fette, Seifen, Anstrichmittel*, v. 58, Dec. 1956, p. 1067-1070.

Measurement of the heat of reaction caused by the action of metal catalysts on preoxidized turpentine offers the possibility of a direct valuation of the siccative effect.

8293* (German.) Synthesis and Properties of Vinyl Fatty Acids. **Synthese und Eigenschaften von Vinyl-fettsäuren.** A. Seher. *Fette, Seifen, Anstrichmittel*, v. 58, Dec. 1956, p. 1077-1080.

Synthesis of the acids $CH_2{=}CH{\cdot}(CH_2)n{\cdot}COOH$ for the comparison of properties.

8294 1,2,6-Hexanetriol in Alkyd Resins. Roy W. Tess, Richard D. Harline, and Thomas F. Mika. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 374-378.

Compared to glycerol, hexanetriol alkyds are lower in viscosity and slower in drying, and films are softer but much more flexible. Films have excellent retention of flexibility, impact resistance, and color on simple aging or heat aging.

8295 Acrylonitrile in Styrenated Alkyd Resins. J. C. Petropoulos, L. E. Cadwell, and W. F. Hart. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 379-381.

Acrylonitrile as a partial replacement for styrene in surface coatings improves solvent resistance, drying rate, and in enamels during early stages of exterior exposure, reduces chalking and bronzing.

8296 Effect of Ceramic Coatings on Creep of Alloys. J. R. Cuthill, J. C. Richmond, and N. J. Tighe. *Industrial Heating*, v. 24, Mar. 1957, p. 582 + 3 pages.

The coating N-143 is not sufficiently fluid at 1800 F to follow the deformation of the specimen at the very high strain rates occurring when a stress of 2200 psi. is applied and it therefore cracks. At higher temperatures it was effective in reducing creep.

8297 How to Get More for Your Metalworking Dollar. VIII. Organic Finishing. *Iron Age*, v. 179, Mar. 21, 1957, p. 107-122.

Pointers for better painting; how to rate primers; storing and handling paints; cleaning and preparation of steel before finishing; various testing methods.

8298 Get More Protection From Galvanized Coatings. A. T. Baldwin and W. H. McMullen. *Iron Age*, v. 179, Mar. 28, 1957, p. 115-117.

Metallographic studies show what happens in coating and suggest ways of improving ductility in thick Zn films.

8299 Flame Spraying Spins Protective Coating for Missiles. *Jet Propulsion*, v. 27, Mar. 1957, p. 306-311.

Details of some promising flames spraying processes.

8300 Surface Treatment and Finishing of Light Metals. XIIC. Plating on Aluminum—Zinc Immersion Processes. S. Wernick and R. Pinner. *Metal Finishing*, v. 55, Mar. 1957, p. 58-61.

Plating flow sheet. Electroplating on the Zn deposit.

8301* Factors Affecting Gloss and Color Retention Characteristics of an Aircraft Lacquer. A. I. Falkowitz and W. A. Gottfried. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, Mar. 1957, p. 243-250.

Gloss and color retention characteristics of military aircraft lacquers are markedly influenced by choice of plasticizer, alkyd resin, and the pigments for a particular color, and by the ratio of the three prime components of the vehicle: nitrocellulose, plasticizer, and alkyd.

8302* Nepheline Syenite as an Extender Pigment for Paint. W. N. B. Armstrong and V. K. Croutch. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 29, Mar. 1957, p. 272-288.

Extensive tests favor nepheline syenite as an excellent extender pigment for many types of paints.

8303 Current Views on How Paint Films Prevent Corrosion. J. E. O. Mayne. *Oil & Colour Chemists' Association, Journal*, v. 40, Mar. 1957, p. 183-199.

Arguments leading to the conclusion that protection is associated with a high electrical resistance. Effect of ions on this resistance.

8304 Weathering Characteristics of Zinc Oxide Pigments. J. R. Rischbieth. *Oil & Colour Chemists' Association, Journal*, v. 40, Mar. 1957, p. 212-220.

Chalking-type zinc oxides promote severe early chalking and premature failure by cracking and flaking, and are unsuitable for use in any appreciable proportion in exterior oil-type house-finishing paints. Chalk-resistant zinc oxides do not accelerate the development of these defects.

8305* (Hungarian.) The Application of Aluminum for the Protection of Iron Against Scaling and Corrosion. **Aluminium alkalmazása vasnak revésedés és korrózió elleni védelmére.** Maria Holló Gyenes. *Öntöde*, v. 7, Oct. 1956, p. 220-223.

Types of processes for the production of protective coatings. Selection of processes according to application of protected article.

8306* Water Based Industrial Coatings. Gerould Allyn. *Organic Finishing*, v. 17, Mar. 1956, p. 15-21.

Present applications of water as a paint solvent or thinner include metal primers based on acrylic resins, white appliance primers, industrial enamel, multicolor lacquers, fire retardant and intumescent paints, camouflage paints, silicone water proofing composition, cement coatings, water stains, and emulsion waxes.

8307 Wax Polish Technology and Testing Methods. C. L. Jones. *Paint Technology*, v. 21, Feb. 1957, p. 43-48.

Various types of wax polishes and methods of testing and evaluating them.

8308 Single-Coat Multicolour Finishes. A. Tremain and W. Morris. *Paint Technology*, v. 21, Mar. 1957, p. 83-87.

General principles; uses and technical advantages; formulations; limiting and controlling factors; pigmentation; application by spray.

8309* Pigment Colors for Paint. I. Blues and Violets. George Wormald. *Paint and Varnish Production*, v. 47, Mar. 1957, p. 37-44.

Properties, advantages, and disadvantages of various blue and violet pigments.

8310* Spraying Polyurethanes. Harold C. Fornwall. *Paint and Varnish Production*, v. 47, Mar. 1957, p. 51 + 4 pages.

The DeVilbiss catalyst spray system provides a practical and convenient means of handling catalyst and additive materials which either cannot be premixed or have insufficient pot life to allow application in the conventional spray manner.

8311 The Development of Plastisol Systems for the Metal Coating Industry. R. F. McTague. *Plating*, v. 44, Mar. 1957, p. 263-265.

A review of plastisol development; physical and chemical properties that can be expected from sprayed plastisol coatings.

8312 New Developments in the Field of Organic Coatings. B. F. Ames. *Plating*, v. 44, Mar. 1957, p. 266-268.

Basic characteristics and uses of silicones, vinyls, epoxy resins, modified resins, and chlorinated rubber. Protective and decorative finishes for metal. Fungus-resistant finishes.

8313 Organic Coatings in Metal Finishing. L. J. Nowacki. *Plating*, v. 44, Mar. 1957, p. 269-273.

Advances in the organic coatings industry; types of coatings available; mechanics of film formation.

8314 Selecting and Testing Finishing Materials. H. P. Wertman. *Plating*, v. 44, Mar. 1957, p. 279-280.

A general introduction to future papers concerning qualities to be considered in selecting an organic finishing material and some of the instruments used in testing these properties.

8315 Products Finishing Directory. 320 p. Mar. 1957. Gardner Publications, Cincinnati. (T13 F49p)

Products, finishing equipment, materials, processes, services, manufacturers, distributors, and product literature.

8316 (German.) Experience With Polymer Dispersing Materials for Paint. **Erfahrungen mit Kunststoffdispersionen für Anstrichfarben.** Helmut Disselhoff. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, Feb. 1957, p. 56-63.

The advantages and disadvantages of polymer dispersions are discussed and their limitations indicated.

8317 Modern Paints and Their Application. E. E. Coker. *Sheet Metal Industries*, v. 34, Mar. 1957, p. 209 + 3 pages.

A short review of coating systems. Airless and steam painting are mentioned.

8318* (German.) Lithia Mica as Enamel Raw Material. **Lithiumglimmer als Emailrohstoff.** Josef Várka. *Silikattechnik*, v. 8, Feb. 1957, p. 54-55.

"Erzgebirge" lithia mica can be used as a raw material in enamels. Batch compositions are indicated.

8319* (Russian.) Combination of Wire Patenting and Galvanizing. **Sovmeshchenie patentirovaniia i otsinkovaniia provolki.** N. S. Zolotukhina, F. K. Tulenkov, and I. I. Vainshenker. *Stal'*, v. 7, Feb. 1957, p. 165-168.

When patenting and galvanizing wire simultaneously it is possible to reduce the cost considerably.

8320* (Finnish.) Ebonite Coatings Protect Metal Surfaces Against Corrosion. **Kovakumi korroosion estoaineena.** A. Soininen. *Teknillisen Kemian Aikakauslehti*, v. 14, Feb. 15, 1957, p. 67-68.

Ebonite is still being used because of its chemical resistance and good physical properties.

8321 Automatic Zinc Spraying of Steel Drums. G. A. Curson. *Welding and Metal Fabrication*, v. 25, Mar. 1957, p. 78-81.

The new Schori Model 50 flame powder spraying gun and its application are discussed.

See also: **8069** (oxidation of linoleic and linolenic acids); **8422** (protective metallic coatings); **8805** (galvanizing pretreatment); **8830** (sulfidizing steel and cast iron).

CONTROL SYSTEMS, COMPUTERS, AND SYSTEMS ENGINEERING

8322* (Spanish.) Automation. **Automatización.** Jorge Cabot Roqueta. *Acero y Energia*, v. 13, Nov.-Dec. 1956, p. 35 + 11 pages.

The modern concept of automation, its technical elements, and various applications.

8323 Automation for Valves. M. D. Braid. *Automation*, v. 4, Apr. 1957, p. 48-53.

Highlights primary factors to be considered in applying automation to small parts manufacture.

8324 Automation in Theory and Practice. E. M. Hugh-Jones, editor. 140 p. 1956. Basil Blackwell, Oxford, England. (HD45 H87a)

Seven lectures by English scientists covering principles, engineering aspects, and effects on trade unions and society in general.

8325 Automation: Its Purpose & Future. Magnus Pyke. 191 p. 1957. Philosophical Library, New York. (TJ215 P99a)

A review of automation in such diverse applications as chemistry, the petroleum industry, accounting, transportation, food preparation and catering, guided missiles, and language translation.

8326 A Transistor Gating Matrix for a Simulated Warfare Computer. W. H. Mac Williams, Jr. *Bell Laboratories Record*, v. 35, Mar. 1957, p. 94-99.

Details of a circuit that uses point-contact transistors, and is applied to the problem of assigning a warship's guns to the proper attacking airplanes.

8327 Application of Junction Transistors to Carrier-Frequency Computing Amplifiers. W. A. Curtin. *Communication and Electronics*, Jan. 1957, p. 746-752.

8328 Analysis of Linear Sampled-Data Systems With Finite Pulse Width: Open Loop. G. Farmanfarma. *Communication and Electronics*, Jan. 1957, p. 808-819.

Analysis is based on introducing a new transform method, analogous to the z-transform, except that the actual pulse width and pulse shape are considered.

8329 Use Electrohydraulic Pump-Servos for Heavy Industrial Control. Norbert J. Nitka. *Control Engineering*, v. 4, Apr. 1957, p. 81-89.

Linear-servo analytical techniques are applied to the design of high-horsepower industrial systems that employ electrohydraulic servos.

8330 Use Difference Equations to Calculate Frequency Response From Transient Response. H. Levenstein. *Control Engineering*, v. 4, Apr. 1957, p. 90-93.

8331* Digital Positioning Control for Precision Jig Borer. Edward E. Kirkham. *Electrical Manufacturing*, v. 59, Mar. 1957, p. 118-125.

Adapting a proven combination micrometer and inductive bridge method of locating the worktable simplifies some of the accuracy problems in design of a numerical control for a precision machine tool which takes its instructions from punched tape. Features include use of conventional decimal digits plus an autotransformer digital-to-analog converter.

8332* Signal Pickoffs for Control Systems. II. Donald A. Davies. *Electrical Manufacturing*, v. 59, Mar. 1957, p. 150-156.

Inductive and photoelectric types.

8333 (German.) Electronic Digital Computing and Information Processing. **Elektronische Rechenmaschinen und Informationsverarbeitung.** 229 p. 1956. J. Wosnik, Friedr. Vieweg & Sohn, Braunschweig, Germany. Price DM, 26. (TK3 F39f Vis.)

Collection of works on computing devices and machines, written by authors from several countries. Development of automatic computing machines; materials used in their construction; programming techniques; numerical mathematics; experience and problems.

8334 The Junction Transistor as a Computing Element. III. E. Wolfendale, L. P. Morgan, and W. L. Stephenson. *Electronic Engineering*, v. 29, Mar. 1957, p. 136-139.

Examples of the use of transistors in computing circuits.

8335 Counters Select Magnetic Drum Sectors. A. J. Strassman and R. E. King. *Electronics*, v. 30, Apr. 1, 1957, p. 161-163.

A 16- and 100-digit counter combined with logic circuits is presented.

8336 Ferrite Apertured Plate for Random Access Memory. Jan. A. Rajchman. *I.R.E., Proceedings*, v. 45, Mar. 1957, p. 325-334.

Experimental prototype plate has 256 holes of 0.025 in. in a square of 0.830 x 0.830 in. A current of 330 ma. reverses the magnetization around a hole in 1.5μ sec. and produces 30 mv. The hysteresis loop has good rectangularity and the properties of the holes are uniform within ±5%.

8337 Design and Use of the Reactivity Computer. Gilbert S. Stubbs. *Institute of Radio Engineers, Transactions on Nuclear Science*, v. NS-4, Mar. 1957, p. 40-48. (TK1 In6.6ns Contin.)

Two electrical analog computer designs are described which compute the reactivity from electrical signals which are provided by conventional reactor instrumentation systems. One computer utilizes a neutron flux imput signal; the other employs a log-rate (of neutron flux) input signal.

8338 Digital Computers. XVII. Digital Automation. Martin L. Klein, Frank K. Williams, and Harry C. Morgan. *Instruments and Automation*, v. 30, Mar. 1957, p. 449-456.

An introduction to digital computer techniques and equipment.

8339 Logical Design With Symbolic Logic. Robert W. Brooks. *Instruments and Automation*, v. 30, Mar. 1957, p. 457-463.

A clear and thorough introduction to symbolic logic and its uses.

8340 Cost of Pneumatic Control Systems. E. I. Thomas. *Instruments and Automation*, v. 30, Mar. 1957, p. 464-469.

Complete costs both for labor and material of plastic tubing installations are presented.

8341 The Cryotron—A Superconductive Computer Component. D. A. Buck. *Instruments and Automation*, v. 30, Mar. 1957, p. 476-478.

Describes a superconductive element whose resistance can be switched from zero to a finite value by a small current in a control winding that is itself superconducting at all times.

8342 Electro-Nomics. Carl A. Vossberg. *Iron and Steel Engineer*, v. 34, Mar. 1957, p. 93-97.

The concept of rate-of-change detection and measurement enable the application of dynamics and electronics to the solution of many industrial measuring and control problems. Advantages are reliability, stability, and performance independent of parameter changes.

8343* Operational Electronic Analog Computers. Hugo M. Martinez. *ISA Journal*, v. 4, Mar. 1957, p. 82-88.

The general nature of various computer types.

8344 An Introduction to the Study of Non-Linear Control Systems. J. F. Coales. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 41-47.

Non-linearity is explained and defined by deriving the law of superposition for linear systems and showing that it does not apply to non-linear systems.

8345 Mathematics and Computers. George R. Stibitz and Jules A. Larrivee. 228 p. 1957. McGraw-Hill, New York. (QA71 St51m)

Covers the field of applied mathematics, especially in relation to automatic digital computers as useful tools in science, technology, and business.

8346 Data Processing for Burst Slug Systems. D. D. Bowen. *Nuclear Power*, v. 2, Mar. 1957, p. 91-95.

Berkeley power station will use electronic computers for gas activity monitoring.

8347 The Punched Card Annual of Machine Accounting and Data Processing. D. A. Talucci, editor. v. V. 205 p. 1956. Punched Card Publishing Co., Detroit. (HF5371 P96 Over.)

Utility of punched card machine accounting and data processing from management's viewpoint. Methods and procedures, embodying operations in all types of business and industry. Tips on tabulating and coding.

8348 Data Reduction and Plant Analysis. C. A. Laws. *Research*, v. 10, Feb. 1957, p. 61-70.

Description of essential components of data reduction equipment.

8349* Control Engineering and the Automatic Process Plant. D. S. Townsend. *Society of Instrument Technology, Transactions*, v. 9, Mar. 1957, p. 13-25.

Implications inherent in the conception of the completely automatic process plant as applied in refinery process control and design.

8350 Automatic Data Reduction. II. A Catalog of Devices Useful in Automatic Data Reduction. Robert S. Hollitch and Albert K. Hawkes. *U. S. Department of Commerce, Office of Technical Services*, PB111928, Nov. 1954, 74 p. (TL507 Un3.18w Vis.)

Characteristics of analog voltage to digital converters, special tape recorders, shaft position digitizers, digital to analog converters, and digital voltmeters and plotters.

8351 Wanda—A One-Dimensional Few Group Diffusion Equation Code for the IBM-704. Orville J. Marlowe, Carl P. Saalbach, Linwood M. Culpepper, and Dorothy S. McCathy. *Westinghouse Electric Corporation (U. S. Atomic Energy Commission)*, WAPD-TM-28, 38 p. Nov. 1956. (UF767 Un3.1wa Contin.)

Wanda is a two-to-four group, one-dimensional reactor design code offering the choice of three types of geometry, four sets of boundary conditions, three kinds of criticality searches or no criticality search, and the choice of specifying certain of the data either regionwise or pointwise.

See also: **7866** (aircraft flight analyzer); **8366** (electronic motor control); **8477** (television control systems); **8592** (seismic computer); **8677** (hydraulic servo); **8835** (automatic heat treatment equipment); **9124** (computers for business); **9130** (electronic processing of time study data); **9131** (automation in industrial engineering).

ELECTRICAL ENGINEERING

8352 Contact Electrification Across Metal-Dielectric and Dielectric-Dielectric Interfaces. G. S. Rose and S. G. Ward. *British Journal of Applied Physics*, v. 8, Mar. 1957, p. 121-126.

For two given materials the amount of charge is proportional to the contact area between the surfaces and provided that one of the surfaces has a resistivity above a critical value ($5 \times 10^{11} \omega$ cm.) then the charge density for various combinations of materials is approximately proportional to the lower dielectric constant in each combination.

8353* Impulse Testing of E.H.V. Transformers With 1775 KV. B. Gänger. *Brown Boveri Review*, v. 43, Dec. 1956, p. 525-532.

A power transformer rated at 380 kv. was subjected to impulse tests in addition to the normal alternating voltage tests.

8354 Colorado High Altitude Corona Tests. Pt. I. Scope, Tests and Instrumentation. L. M. Robertson, C. F. Wagner, and T. J. Bliss. 32 p. 1957. American Institute of Electrical Engineers, Ohio Brass Co., Mansfield. (TK3226 Am35p)

Details of a program to evaluate corona, radio influence, and mechanical line design of high or extra-high-voltage lines at high altitudes. Tests, instrumentation, insulators, conductors, towers, and footings.

8355 Styroflex Aluminum-Sheathed Air-Dielectric Cable. E. J. Merrell, A. L. McKean, and J. Arbuthnott, Jr. *Communication and Electronics*, Jan. 1957, p. 669-675.

Outstanding properties and advantages include long continuous lengths on reels, excellent uniformity, low attenuation, permanent electric properties, no radiation, light weight, and high strength.

8356 Recent Developments in 4-Wire Switching of Long-Distance Telephone Circuits. Imre Molnar. *Communication and Electronics*, Jan. 1957, p. 722-733.

New system incorporates the network switching, principle of operation in its transmission paths.

8357 The Fused Silicon Rectifier. Herbert W. Henkels. *Communication and Electronics*, Jan. 1957, p. 733-746.

Basic cell fabrication, properties, and applications. Properties of component metals and alloys.

8358 A Method of Designing Small Power Transformers for Communication Equipment. Hubert S. Sear. *Communication and Electronics*, Jan. 1957, p. 758-761.

Method is suitable for power transformers operating at any frequency where stray capacitative and inductive effects are negligible, having one or more secondary windings, and rated up to 500 v.-amp.

8359 Accurate Determination of the Capacitance of a Thin Rectangular Plate. Daniel K. Reitan and Thomas J. Higgins. *Communication and Electronics*, Jan. 1957, p. 761-766.

8360 Arc-Resistant Molding Materials and Finishes. R. F. Sterling. *Communication and Electronics*, Jan. 1957, p. 776-780.

By incorporating any of a number of submicron inorganic refractory fillers, the ASTM arc resistance of phenolic and substituted phenolic molding compounds and a number of non-arc-resistant finishes can be greatly increased.

8361 Direct-Water-Cooled Germanium Power Rectifier. R. E. Wahl. *Communication and Electronics*, Jan. 1957, p. 832-841.

Characteristics and advantages; electrochemical problems; cathodic protection; transformers.

8362* (French.) Measuring High Periodic Voltages by Capacitor Current. **Sur la mesure des hautes tensions périodiques par courant de capacité.** Jean Lagasse and Georges Giralt. *Comptes Rendus*, v. 244, Jan. 21, 1957, p. 442-444.

Improved the measuring of crest values of high periodic potentials by using semi-conductors starting from the rectification of the currrent running through a standard condenser.

8363* (Russian.) The Influence of Second Harmonics in the Expansions of Inductances and Mutual Inductances of the Stator on the Structure of Equations for Transient Processes in Synchronous Machines. **O vliianii vtorykh garmonik v razlozheniiakh induktivnostei i vzaimoinduktivnostei statora na strukturu uravnenii perekhodynkh protsessov sinkhronnoi mashiny.** S. V. Strakhov. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 58-61.

Mathematical formulas for computing the above are derived.

8364* A Half-Wave Bridge Magnetic Amplifier. W. Gregson. *Electrical Energy*, v. 1, Mar. 1957, p. 200-206.

Describes a fast acting servo amplifier which accepts either an a.c. or d.c. signal voltage, and delivers into a load uni-directional pulses of current whose polarity is dependent upon the phase or polarity of the input voltage.

8365* The Equivalent Circuit of the Transformer and Induction Motor. D. Harrison. *Electrical Energy*, v. 1, Mar. 1957, p. 208-211.

Practical circuits are derived from the usual exact circuits, by simple circuit theory, without invoking complex-ratio transformers.

8366* Electronic Controls for Timed Acceleration of D-C Motors. P. A. Herrmann. *Electrical Manufacturing*, v. 59, Mar. 1957, p. 132-140.

Three widely different circuits designed for "linearizing" the input signals to closed-loop servos controlling integral hp. d.c. motors.

8367 Radial Shunt Is Used for Measuring 100,000-Ampere Pulses. H. Bruce McFarlane. *Electronic Industries & Tele-Tech*, v. 16, Apr. 1957, p. 58-60.

Large, H.F., short-pulse currents normally beyond the capabilities of a measuring instrument are measured to an average error of 2½% with a noninductive radial shunt in conjunction with an oscilloscope.

8368 Mechanized Production of TV Wiring Boards. John Markus. *Electronics*, v. 30, Apr. 1, 1957, p. 138-143.

Operation details of semi-automatic resist printer, automatic etcher, sheet heater, board processor, component assembly machines, selective dip-soldering machines, board scrubber, and error-printing automatic testers.

8369* (Czech.) Air-Blast Resistance Circuit-Breakers. **Tlakovzdušné vypinače odporové.** Aleš Pražák. *Elektrotechnicky Obzor*, v. 45, Dec. 1956, p. 595-597.

Principle and scope of application of resistance circuit-breakers. Action is explained by means of characteristic oscillograms.

8370* (Czech.) High-Voltage Cut-Outs and Their Use. **Pojistky na vysoké napětí a jejich použití.** Emil Langer. *Elektrotechnický Obzor*, v. 45, Dec. 1956, p. 597-600.

Economic and technical advantages obtained by employing high-voltage cut-outs up to 35 kv. with a circuit-breaking capacity of 400 MVA; action of the cut-outs and the over-voltage arising in circuit-breaking; types of cut-outs, their technical parameters, and application.

8371* (Czech.) Design of an Economic Low-Voltage Power Grid. **Hospodárný návrh mřižové sítě nn.** Bohumír Pavlovský. *Elektrotechnický Obzor*, v. 46, Feb. 1957, p. 55-61.

Design on a basis of lowest cost of equipment and operating factors.

8372* (Czech.) Supervoltage Cable Design. **Konstrukce kabelů velmi vysokého napětí.** Miroslav Maršál *Elektrotechnický Obzor*, v. 46, Feb. 1957, p. 61-69.

Describes oil-filled, compression, oil-pressure, and gas-pressure cables.

8373* (Czech.) Shielding of Induction Furnaces for Steel Melting. **Stínění indukční pece na tavení oceli.** Emil Langer. *Elektrotechnický Obzor*, v. 46, Feb. 1957, p. 69-75.

Methods of reducing the intensity of the magnetic field outside the coil.

8374* (German.) Plastic Cables in Power Stations. **Kunststoffkabel im Kraftwerksbau.** Hans-Joachim Hilgendorff. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, Feb. 1957, p. 98-101.

Description of plastic cables with no lead jackets for 1 and 6 kv. lines extensively used in the heavy duty network of a power station and sometimes between generator and transformers. Advantages and some precautions are outlined.

8375* (German.) Evaluation of Electrical Insulating Material Life at a Constant and Variable Aging Temperature. **Zur Berechnung der Lebensdauer elektrischer Isolierstoffe bei konstanten und veränderlichen Alterungstemperaturen.** Hans-Jürgen Frentz. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, Feb. 1957, p. 156-161.

8376* (German.) Direct Transformation of Nuclear Energy Into Electricity. **Die unmittelbare umwandlung von Kernenergie in Elektrizität.** Joachim Euler. *ETZ, Elektrotechnische Zeitschrift*, v. 78, Ausgabe A, Feb. 1957, p. 162-164.

Comparison methods of obtaining electrical current directly from nuclear energy, bypassing the production of heat. Evaluation of the methods.

8377 New Trends in High-Temperature Cables. B. J. Mulvey. *General Electric Review*, v. 60, Mar. 1957, p. 17-19.

Includes table showing properties of silicone rubber, natural rubber, GR-S, Neoprene, butyl, polyvinyl chloride, and polyethylene insulation materials.

8378* A Highway Lighting Test Installation. George A. Nagel. *Illuminating Engineering*, v. 52, Mar. 1957, p. 155-171.

Information and public opinion data pertinent to the problem of lighting turnpikes so as to be pleasant and attractive as well as safe for night use.

8379* American Standard Practice for Protective Lighting. *Illuminating Engineering*, v. 52, Mar. 1957, p. 174-188.

Standards for outdoor lighting to provide plant protection. Principles involved; points to be lighted; minimum illumination requirements; suggestions for obtaining prescribed performance.

8380* Corona and Its Effect on Insulation—A Résumé. II. T. W. Liao. *Insulation*, v. 3, Apr. 1957, p. 22-24.

The corona problem in capacitors, cables, transformers, and other electrical equipment.

8381* (Russian.) Experimental Investigation of the Volume Charge in the Field of an AC Corona. **Eksperimental'noe issledovanie dvizheniia obemnogo zariada v pole korony peremennogo toka.** V. I. Levitov, A. G. Liapin, and V. I. Popkov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 14-32.

Showed experimentally that there is a drift of the volume charge away from the surface of the conductor. The charge can remain in the drift zone for 25 periods from the moment of its formation (0.5 sec. for 50 cycle a.c.).

8382* (Russian.) Electromagnetic Transient Processes in Asynchronous Motors With Changes in Frequency and Voltage. **Elektromagnetnye perekhodnye protsessy v asinkhronnom**

dvigatele pri izmeniaiushchikhsia chastote i napriazhenii. V. V. Gorskii. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 39-43.

Computation of electromagnetic transients which occur when the motor is started. There is a substantial transient component which, under certain conditions, can change not only the value, but also the sign of the electromagnetic moment.

8383* (Russian.) The Electrical Stability of the Air in Electrical Switches Operating in Air. **Elektricheskaia prochnost' vozdukha v vozdushnom vykliuchatele.** N. Z. Aronzon and V. N. Borisov. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 149-152.

Causes and means of eliminating arcing in electric switches.

8384 Vibration Modes of Stators of Induction Motors. E. Erdelyi and G. Horvay. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 39-45.

Determining vibration characteristics of two concentric shells (stator core inside the stator frame) coupled by nonrigid ribs.

8385 A 100 kV Compressed-Gas Standard Capacitor. T. R. Foord. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 68-70.

Instrument has a capacitance of 99.2 pF and is filled with N at 120 psi.

8386* (Hungarian.) Joining of Aluminum to Copper and Iron for Electrical Conductors. **Alumínium kötése rézzel és vassal elektromos vezetők számára.** József Lukács. *Kohászati Lapok*, v. 11, Oct. 1956, p. 478-480.

Connections produced by powder metallurgy. By high-voltage fusion Ag coatings were also produced on Al surfaces.

8387* (German.) The Effect of the Magnetic Field on Elementary Currents. **Über den Kraftangriff des Magnetfeldes an Elementarströmen.** H. Hofmann. *Österreichisches Ingenieur-Archiv*, v. 11, Jan. 1957, p. 1-5.

A detailed evaluation of the direct and fixed effect of a magnetic force on elementary currents. Studies the direct amplitude of the stationary magnetic field of the "Elementary Current Theory" in the case of physical limitation.

8388 Colour and Colour Rendering of Tubular Fluorescent Lamps. A. A. Kruithof and J. L. Ouweltjes. *Philips Technical Review*, v. 18, Feb. 1957, p. 249-260.

By using a mixture of various phosphors in a tubular fluorescent lamp, the color point of the lamp in the chromaticity diagram can be varied within wide limits. Recent investigations have resulted in a range of lamps with largely natural color rendering.

8389 (English.) **On the Possibility of a Dynamic Variety of the Intermediate Superconductive State.** C. J. Gorter. *Physica*, v. 23, Jan. 1957, p. 45-56.

8390 Size Effects in the Superconductivity of Cadmium. R. A. Hein and M. C. Steele. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 877-882.

8391 Thermal Fluctuations in Conductors. Nandor L. Balazs. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 896-899.

For small frequencies the current fluctuations are reduced to Nyquist's relation. For large frequencies the current fluctuations are proportional to the (skin) resistance and depend also on the shape of the conductor.

8392* (English.) **Electromagnetic Fields Due to Current Flowing Parallel to Interface of Two Different Media.** Kazuo Horiuchi. *Physical Society of Japan, Journal*, v. 12, Feb. 1957, p. 170-176.

Problems are dealt with by integral equations of Wiener-Hopf type, and described from a relatively general point of view.

8393 Relativistic Electrodynamics of Rotating Media. John Ise, Jr. *University of California, Radiation Laboratory, (U. S. Atomic Energy Commission)*, UCRL-3636, Jan. 1957, 24 p. (UF767 U3u Contin.)

Electromagnetic field equations in rotating systems are derived from the generally covariant tensor formulation and applied to some of the classical problems of spinning magnets and dielectric cylinders.

8394 Low Speed Rotary Motors for Sealed Systems. W. E. McCown. *Westinghouse Electric Corporation, Atomic Power Division, (U. S. Atomic Energy Commission)*, WAPD-T-66, 1954, 9 p. (UF767 Un3.1wa Contin.)

Special canned and slip-on stator type motors were successfully built for the purpose of producing rotary motion within a sealed, pressurized system.

8395* (Russian.) Thermo E.M.F., Electroconductivity, Hall Constant, and Nernst Constant for Amorphous Substances With Electronic Conductivity. **Elektroprovodnost, teploprovodnost termoeds, postoiannaia Kholla i postoiannaia Nernsta dlia amorfnykh tel s elektronnoi provodimost'iu.** A. I. Gubanov. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 3-11.

A study of the effects of temperature on various kinetic coefficients of amorphous conductive substances and a calculation of the specific dispersion of the electrons; connected with the absence of a remote arrangement.

8396* (Russian.) Electrical Properties of Some Complex Tungsten Oxides. **Elektricheskie svoistva nekotorykh slozhnykh vol'framovykh okislov.** Z. I. Ornatskaia. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 130-137.

A study of the electrical properties of Na_2WO_4 and Li_2WO_4 and of baked bronzes of the same-high conductivity between normal temperature and 250 and 270 C. The coefficients of thermo e.m.f. of the bronzes were negative.

See also: **7990** (dielectric properties of cadmium niobates); **8706** (Al cable sheathing); **8732** (corrosion control of underground cables); **8837** (electrical equipment for strip annealing mill); **8909** (rolling mill electrical equipment); **9034** (atomic electric power plant); **9240** (polyethylene insulation); **9349** (control equipment for welding transformers).

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8397* (German.) Anodic Oxidation of Cast Aluminum Decorative Fittings. **Anodische Oxydation von gegossenen Aluminium-Beschlagteilen.** *Aluminium*, v. 33, Mar. 1957, p. 179-181.

Best limits of composition for the alloys commonly used. Thicknesses of anodized layers needed in practice is about 10μ.

8398 Anodic Chronopotentiometry With Platinum and Gold Electrodes. The Iodide-Iodine-Iodate System. Fred C. Anson and James J. Lingane. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1015-1020.

Conclusive proof that iodate ion, rather than hypoiodous acid, is the oxidation product of I in dilute H_2SO_4 or $HClO_4$ acid solutions at both Pt and Au electrodes.

8399 On the Problem of Multilayer Chromium Plating. A. N. Sysoev and N. T. Drobantseva. *Henry Brutcher Translation No.* 3820, 10 p. (From *Zhurnal Prikladnoi Khimii*, v. 28, no. 12, 1955, p. 1308-1313.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 3123, v. 5, Apr. 1956.

8400* (French.) The Activity of Compensating Ions in Colloidal Solutions. **Sur l'activité des ions compensateurs dans les solutions colloidales. III.** A. Dobry. *Bulletin de la Société Chimique de France*, no. 3, Mar. 1957, p. 320-323.

An experimental confirmation of the Overbeck theory concerning the conductivity of colloidal solutions, showing that the electromotive force does not depend upon the chemical nature of the liquid junction of the mobility of the cation and anion of the electrolyte are nearly equal.

8401 Nickel-Cadmium Batteries. II. Impregnation of Positive Plates by Thermal Decomposition of Aqueous Nickel Nitrate. P. L. Bourgault, Phyllis E. Lake, E. J. Casey, and A. R. Dubois. *Canadian Journal of Technology*, v. 43, Mar. 1957, p. 495-502.

Sintered Ni plaques are first immersed in aqueous $Ni(NO_3)_2$ which then decomposes at high temperatures to an intermediate which converts rapidly to $Ni(OH)_2$ in caustic solutions. Effects of temperature and time of immersion, thermal decomposition and surrounding atmosphere were studied.

8402* (French.) The Electrochemical Behavior of Chlorine. Equilibrium Diagrams of pH vs. Potential in the Cl-H_2O System at 25 C. **Comportement électrochimique du chlore. Diagramme d'équilibre tension-pH du système Cl-H_2O, à 25°C.** G. Valensi, E. Deltombe, N. de Zoubov, and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique No.* 44, Feb. 1957, p. 1-21. (TA462 C33r Contin.)

On the basis of values of free energy of formation of the various constituents of the Cl-H_2O system, the authors establish diagrams showing the conditions of equilibrium of the various electrochemical reactions that can effect these constituents at 25 C.

8403* (French.) A Heavy Water Electrolyzer for Producing Deuterium Used With Accelerators. **Sur un électrolyseur d'eau lourde pour la production de deuterium à l'usage des accélérateurs.** Alexandre Reznik, Guy Laforgerie, and Guy Dupré. *Comptes Rendus*, v. 244, Feb. 4, 1957, p. 760-762.

Description of an electrolyzer having the principle of an electrolytic resistance varying according to the quantity and flow of the gas required.

8404 Limitations of Plated Nickel in Jet Engine Design. R. W. Moeller and W. A. Snell. *Electroplating and Metal Finishing*, v. 10, Mar. 1957, p. 74 + 4 pages.

Residual stress vs. temperature and fatigue life; plate thickness vs. corrosion resistance; production control variations. Limitations of Ni plated from the Watts' type, sulfamate, and chemical Ni solutions.

8405 Temperature Rise During Formation of Anodic Oxide Films. Lawrence Young. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 229-233.

The temperature rise in electrodes immersed in unstirred solutions is negligible at 1 milliamp. per sq. cm., but accounts for low fields at higher current densities.

8406 Gold Plating. Edward A. Parker. 10 p. Technic, Inc., Providence. (Phamphlet)

Bath formulas for various applications; plating variables; special preparatory treatments; testing Au deposits.

8407 Electrolytic Preparation of Periodate Oxystarch. C. L. Mehltretter, J. C. Rankin, and P. R. Watson. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 350-354.

Starch, suspended in the anolyte of a divided cell, was completely oxidized to oxystarch by periodic acid formed electrolytically from iodic acid present.

8408 Formation of Cracks in Soederberg Electrodes Used in Aluminum Reduction Plants. Ove Sandberg, Leif Olsen, and Torgrim Eftestoel. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Feb. 1957, p. 261-266.

Shrinkage may be reduced by using suitable raw materials and paste compositions.

8409 Equilibrium Between Titanium Metal, Titanium Dichloride, and Titanium Trichloride in Molten Sodium Chloride-Strontium Chloride Melts. S. Mellgren and W. Opie. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Feb. 1957, p. 266-269.

Effects of total Ti concentration, temperature, and the ratio of Sr to NaCl on electrodeposition of Ti.

8410 Plating With Insoluble Anodes. Edward R. Jorczyk. *Metal Finishing*, v. 55, Mar. 1957, p. 46-49.

A silver concentration tank is used to counteract detrimental effects of the insoluble anodes on the solution and to replace the Ag metal back into solution at the same rate at which it was plated out.

8411 Metal Finishing Guidebook-Directory. 25th Ed. 642 p. 1957. Finishing Publications, Inc., Westwood, New Jersey. (T13 M56f)

Technical papers on finishing plant engineering, surface preparation, plating solutions and procedures, control, and testing. Tables and data sheets. Directory of suppliers and manufacturers.

8412 Electropolishing. Charles L. Faust. Paper from "Metal Finishing Guidebook-Directory". 25th Ed. Finishing Publications. 1957. p. 442-452. (T13 M56f)

A general discussion of the advantages and limitations of electropolishing, including methods, properties of the metals, equipment, and costs. Surface finish measurements on steels, brass, and Al are reported.

8413 Electrolytic Titanium. R. S. Dean. *Metal Industry*, v. 90, Mar. 1, 1957, p. 165-167.

Sodium reduction is discussed, and Mg and aluminothermal reduction are mentioned. (To be concluded.)

8414* (German.) Refining Gold Alloys Containing Palladium, by Means of a Rectified Current. **Raffination alladiumhaltiger Goldlegierungen mit gleichgerichtetem Strom.** J. Steiner and O. Adlhart. *Metall*, v. 11, Feb. 1957, p. 113-116.

A study of Pd deposition by electrolytically refining the Au with the rectified currents of various curvatures and varying composition of electrolytes.

8415* (German.) Periodic Current Intensity Variations During Anodic Decomposition of Zinc. **Über periodische Stromstärkeschwankungen bei der anodischen Auflösung des Zinks.** K. Schwabe. *Metalloberfläche*, v. 11, Feb. 1957, p. 37-40.

Variations occurred in chloride, bromide, or iodide solutions but not in sulfate, nitrate, or acetate solutions. Concentration had an effect only on the starting time of the variations.

8416 The Electroplating of Zinc Die Castings. Ernest Horvick. *Metal Products Manufacturing*, v. 14, Apr. 1957, p. 68-70.

Rolled and die cast zinc, in its various designs and complex shapes, is taken through the electroplating process in this article.

8417* (French.) An Electrolytic Cell for High Temperatures. **Cellule électrolytique pour hautes températures.** G. Chauvin, H. Coriou, and J. Hure. *Métaux, Corrosion-Industries*, v. 32, Jan. 1957, p. 10-17.

Construction of an electrolytic cell that can be used for laboratory studies and can easily be enlarged for industrial purposes. It is especially adapted for nuclear applications.

8418* (French.) Applying Faraday's Law to Anodic Dissolution of Metals. **Application de la loi de Faraday à la dissolution anodique des métaux.** I. Epelboin and M. Froment. *Métaux, Corrosion-Industries*, v. 32, Feb. 1957, p. 55-72.

Structure of the electrochemical double layer in aqueous solutions of phosphoric acid, melted salts, and electropolishing solutions containing perchloric ions.

8419* Recent Developments in Aluminium Electrodeposition: A Critical Review. R. J. Heritage and J. R. Balmer. *Product Finishing*, v. 10, Mar. 1957, p. 54-58.

Some promising processes include a Grignard electrolyte, a fused mixture of quaternary ammonium salts and an aluminum halide, an aluminum lithium hydride solution, and an aluminum alkyl electrolyte.

8420* The Testing and Examination of Electrodeposits. I. Measurement of Local Thickness. R. Quarendon. *Product Finishing*, v. 10, Mar. 1957, p. 65 + 10 pages.

Jet and dropping tests; microscopic examination methods; coulometric anodic solution; magnetic thickness testers.

8421 Modern Brass Plating. Henry Strow. *Products Finishing*, v. 21, Mar. 1957, p. 24-30.

Proper formulation and control aid in securing desired results from conventional brass and bronze plating solutions. How to prevent and correct commonly encountered difficulties.

8422 Protective Metallic Coatings. Charles L. Faust. 40 p. 1957. American Society for Metals, Cleveland. (TS653 F27p Over.)

Metallic coatings can be used for providing high-temperature surface protection of metals which have the necessary bulk properties but not surface stability for heat tolerance. The properties of a metal vary according to the method of applying it as a coating and according to the physical and mechanical state of the basis metal to be coated. Properties of the composite structure, bulk-basis-metal + different-metal-surface, will depend on the formation of a diffusion alloy zone and on the properties of such a zone between the coating and the basis metal.

8423* **Some Aspects of Electrode Processes.** B. Breyer. *Reviews of Pure and Applied Chemistry*, v. 6, Dec. 1956, p. 249-266.

The perfectly polarized electrode and the depolarized electrode are discussed.

8424 Symposium on Properties, Tests, and Performance of Electrodeposited Metallic Coatings. 129 p. 1956. American Society for Testing Materials, Philadelphia. (TS670 Am35.3sy)

Deals with electrodeposited Zn, Cd, Pb, Cu-Ni-Cr, and Ni-Cr coatings on steel; measurement of surface luster; cleaning practice; phosphate coating over electrodeposited Zn; and the standard salt-spray test.

8425* (English.) **Finishing of Small Gears by Electrolytic Polishing. Electrolytic Finishing of Gears and Changes in Their Shapes.** Masao Naruse and Akira Nannichi. *Technology Reports, Tôhoku University*, v. 21, no. 1, 1956, p. 107-116.

8426* (Russian.) Deformation of Cathode Blocks in the Bath During the Electrolytic Refining of Aluminum. **Deformatsiia katodnykh blokov aliuminievykh vann v protsesse elektoliza.** *Tsvetnye Metally*, v. 30, Feb. 1957, p. 44-51.

New method for accurately measuring the deformation. Effects of impregnation with electrolyte, composition of the filler of the block, temperature, current density, carburization and total load. Measurements may be used as a criterion for evaluating the strength and life of cathode blocks.

8427 Electrorefining Titanium Metal. J. R. Nettle, D. H. Baker, Jr., and F. S. Wartman. *U. S. Bureau of Mines, Report of Investigations* 5315, Feb. 1957, 43 p. (TN21 Un3r)

Refining is accomplished in a fused-salt electrolyte using off-grade metal at the anode and collecting the purified metal at the cathode. Characteristics and requirements of various alkali chlorides tested as electrolytes are discussed in relation to relative ease of purification and serviceability.

See also: **8073** (analysis of lead fluoborate bath); **8300** (electroplating on Al); **8315** (finishing directory); **8776** (dissolution of aluminate in cryolite solution); **8806** (anodizing Al); **8982** (structure of tin electroplate); **9012** (electroplate porosity measurement).

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8428 Elastic Wave Dispersion in a Cylindrical Rod by a Wide-Band Short-Duration Pulse Technique. Jack Oliver. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 184-194.

8429 Note on the Design of "Terminal-Analog" Speech Synthesizers. James L. Flanagan. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 306-310.

Synthesis of vowel sounds by lumped-constant electrical networks having transfer functions similar to the transmission properties of the vocal tract.

8430 The Experimental Study of the Optical Properties of Metals and the Relation of the Results to the Drude Free Electron Theory. L. G. Schulz. *Advances in Physics*, v. 6, Jan. 1957, p. 102-144.

Absorption of electromagnetic radiation by metals; the Drude theory; the amonalous skin effect; experimental methods and conclusions.

8431 Descriptive Theory of Semiconductors. Earl L. Steele. *American Journal of Physics*, v. 25, Mar. 1957, p. 174-179.

A nonmathematical description of the basic ideas and concepts underlying the field of semiconductors and semiconductor devices. Role of the energy band scheme, the impurity donor and acceptor atoms, and the *p-n* junction in semiconductor-device physics.

8432 Electrical Properties of Magnesium Silicide and Magnesium Germanide. Charles R. Whitsett and G. C. Danielson. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-714, July 1955, 81 p. (UF767 Un3.1is Contin.)

8433* (German.) A Contribution to the Theory of the Surface Effect in Secondary Emission. **Zur Theorie des Oberflächeneffekts der Sekundäremission.** W. Brauer and W. Klose. *Annalen der Physik*, v. 19, Dec. 1956, p. 116-132.

Contribution to secondary emission by surface electron configuration. In the case of lighter metals, such as K, about 30% of the emissivity can be explained by primary energies of an order of 100 e.v.

8434 How an Output Transformer Causes Distortion. II. Norman H. Crowhurst. *Audio*, v. 41, Mar. 1957, p. 21-23.

How reactance causes distortion; identifying the distortion; impedance characteristics.

8435* The Application of Transistors to A.M. Broadcast Receivers. B. F. C. Cooper. *British Institution of Radio Engineers, Journal*, v. 17, Feb. 1957, p. 95-106.

A minimum of six transistors is needed to meet specifications, or seven transistors when using a class B output stage. The latter design is to be preferred for running economy.

8436* Amplitude Modulation of Microwaves by Tunable Transmission Waveguide Filters. M. H. N. Potok and J. Barbour. *British Institution of Radio Engineers, Journal*, v. 17, Feb. 1957, p. 109-113.

A linear response and a bandwidth of over 4 kc. per sec. at 9000 Mc. per sec. was obtained using simple components and circuits.

8437* Noise and Its "Spectrum". F. N. H. Robinson. *British Institution of Radio Engineers, Journal*, v. 17, Feb. 1957, p. 115-119.

Analysis based on Campbell's theorem. The meaning of the averages which appear in expressions describing noise is considered.

8438 A Millisecond Relaxation Process in the Reverse Current of Germanium Point-Contact Diodes. R. E. Burgess. *British Journal of Applied Physics*, v. 8, Feb. 1957, p. 62-63.

Redistribution of surface charge is suggested as the most likely cause.

8439 Pre-Breakdown Conduction Between Electrodes in Continuously-Pumped Vacuum Systems. W. K. Mansfield and R. L. Fortescue. *British Journal of Applied Physics*, v. 8, Feb. 1957, p. 73-78.

Operative mechanism may be an exchange of positive and negative ions of H between the electrodes in a regenerative reaction, the source of the ions being a chemi-sorbed layer of hydro-carbon on the electrode surfaces.

8440 The Measurement of Peak Voltage Using a Cathode-Ray Tube. Eric S. Fairley. *British Journal of Applied Physics*, v. 8, Mar. 1957, p. 101-102.

The voltage to be measured is applied across the primary of a standard potential transformer and the secondary voltage, at approximately 110 v., is balanced against a direct voltage, using a cathode-ray tube as a null indicator.

8441* A New Cathode for Electron Tubes. G. J. Ekkers. *Brown Boveri Review*, v. 43, Dec. 1956, p. 554-555.

In contrast to the oxide-coated cathode, this "E" cathode has no semi-conducting layer to limit the passage of current, and is activated near the surface. It is not so sensitive to impurities or filament voltage fluctuation, thus improving tube life.

8442 Increasing the Efficiency of Semiconductor Thermocouples. A. F. Ioffe, S. V. Airapetianc, A. V. Ioffe, N. V. Kolomoyec, and L. S. Stil'bans. *Canada. Defense Scientific Information Service No.* T214 R, May 1956, 2 p. (Translated from *Doklady Akademii Nauk SSSR*, v. 106, no. 6, 1956, p. 981.)

Into the crystal lattice of a thermocouple substance is introduced another substance crystallizing in the same lattice and having approximately the same lattice constant. The resulting small distortions are quite effective for scattering thermal fluctuations having wavelengths close to the lattice constant.

8443 Inverse-Time Underfrequency Relay. R. G. Hoft. *Communication and Electronics*, Jan. 1957, p. 625-629.

Unit is designed to operate over a wide temperature range, from −55 to +71 C, and a wide voltage range, from 70 to 115 volts. It meets military specifications for aircraft equipment.

8444 Color-Television-System Performance Requirements. Ralph Kennedy. *Communication and Electronics*, Jan. 1957, p. 653-659 + 1 plate.

Covers broad aspects of phase, amplitude, and transient requirements.

8445 Frequency Transformations and Dissipative Effects in Electric Wave Filters. D. J. H. Maclean. *Electronic Engineering*, v. 29, Mar. 1957, p. 108-114.

Method for estimating the effects of parasitic dissipation on the amplitude response of filters is based on the zero-pole pattern of the lossless network.

8446* Measurement of Height-Gain at Metre Wavelengths. J. A. Saxton, K. S. Kreielsheimer, and G. W. Luscombe. *Electronic & Radio Engineer*, v. 34, Mar. 1957, p. 89-95.

Measurement of field strength at various altitudes. Shows that under conditions of standard atmospheric refraction the observed height gain is very similar to that predicted by diffraction theory; but divergencies of this theory occur when non-standard modes of propagation occur.

8447* Notes on the Multi-Reflection Klystron. Conditions for Maximum Efficiency. B. Meltzer. *Electronic and Radio Engineer*, v. 34, Mar. 1957, p. 109-112.

Conditions for maximum efficiency (up to 100%) are established by considering the behavior of electrons in the device.

8448 Subminiature Beacon for Guided Missiles. Morton Cohen and Donald Arany. *Electronics*, v. 30, Apr. 1, 1957, p. 144-147.

S-band transponder provides echo to missile-tracking radars and signal that could activate a missile fuel-cutoff system. Circuits are presented.

8449 Tetrajunction Transistor Simplifies Receiver Design. R. J. Farber, A. Proudfit, K. M. St. John, and C. R. Wilhelmsen. *Electronics*, v. 30, Apr. 1, 1957, p. 148-151.

8450 Chronograph Times Supersonic Models. William J. Kerwin. *Electronics*, v. 30, Apr. 1, 1957, p. 152-155.

A 1.6 Mc. counter with an accuracy of $\pm 0.025\mu$ sec. for determining time lapse.

8451* (Czech.) The New Two-Grid Thyratron TK 004. **Nový dvoumřížkový thyratron TK 004.** Erik Vajgl. *Elektrotechnický Obzor*, v. 45, Nov. 1956, p. 560-562.

Detailed description of design of metal tube.

8452* (Russian.) Contribution to the Multi-Electron Theory of Semi-Conductors. **K mnogoelektronnoi teorii poluprovodnikov. I.** S. V. Vonsovskii, Iu. P. Irkhin, A. N. Kushnirenko, and E. A. Turov. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 385-394.

A study of the energy spectra of an electron system which can be considered as the simplest model of an ideal atomic semiconductor. Discusses the existence of Bose and Fermi branches of the elementary oscillation spectrum.

8453* (Russian.) Hall Effect and Resistance Changes in Bismuth in a Magnetic Field. **Effekt kholla i izmenenie soprotivleniia vismuta v magnitnom pole.** V. V. Eremenko. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 449-459.

Studies on Bi single crystals over a wide range of temperatures.

8454 Foundations of Radio. M. G. Scroggie. 6th Rev. Ed. 349 p. 1957. Philosophical Library, New York. (TK6550 Scr52f6)

The whole basic theory of radio is covered, starting with the most elementary principles. Includes theory of valves, transmitters, and all types of modern receivers; techniques of television and radar; aerials; power supplies; transmission lines.

8455 Survey of Mechanical Filters and Their Applications. J. C. Hathaway and D. F. Babcock. *I.R.E., Proceedings*, v. 45, Jan. 1957, p. 5-16.

The development of metal alloys with exceedingly low loss and good temperature stability has added inpetus to the development of mechanical I.F. filtering elements. The most common are the ladder type with resonant plates interconnected by fine wires, the cylindrical rod structure machined to produce alternate necks and slugs, and a cylindrical arrangement with disk resonators interconnected by coupling wires. The center frequency, bandwidth, and filter skirt selectivity are a function of element sizes, spacing, and number of elements used. Transducers provide for the converting of electrical to mechanical energy or mechanical to electrical energy and impedance matching of the filter. These compact elements are especially applicable to carrier systems and single-sideband equipment, and are equally useful in band-pass filtering in high-performance communications receivers. They may be employed in nearly any environmental conditions where other filters are used.

8456 The Vernier Time-Measuring Technique. Robert G. Baron. *I.R.E., Proceedings*, v. 45, Jan. 1957, p. 21-30.

Technique is the electrical analog of the mechanical vernier scale. It will measure the time between two pulses, which jitter relative to each other and occur at some random rate, accurate to $10m\mu$. sec.

8457 Surface Leakage Current in Silicon Fused Junction Diodes. M. Cutler and H. M. Bath. *I.R.E., Proceedings*, v. 45, Jan. 1957, p. 39-43.

The forward and reverse current are compared with predicted equations arising from a simplified model for surface leakage. Analysis of the forward current in the "exponential" region leads to resolution of the contributions of the junction and the leakage path.

8458 Stability and Power Gain of Tuned Transistor Amplifiers. Arthur P. Stern. *I.R.E., Proceedings*, v. 45, Mar. 1957, p. 335-343.

8459 Ferrod Radiator System. F. Reggia, E. G. Spencer, R. D. Hatcher, and J. E. Tompkins. I.R.E., Proceedings, v. 45, Mar. 1957, p. 344-352.

Advantages of these antenna systems include simplicity, low construction costs, no moveable parts, microsecond response to an applied magnetic field, small control currents, and the possibility of relatively broad-band operation at microwave frequencies.

8460 Theory of the Microstrip. Tai Tsun Wu. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 299-302.

A procedure for finding by successive approximation the current distribution, and thus the electromagnetic field, of the lowest mode of the microstrip transmission line.

8461 A Thermistor Device as Automatic Gain Control in Lamp-Photocell Transducer Systems. A. M. Hardie. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 58-62.

Regulator uses thermistors to compensate for the slow drift of illumination from a lamp source and changes in photocell characteristics which normally affect the calibration accuracy of vibration equipment when a photoelectric transducer is employed.

8462 A Survey of Image Storage Tubes. H. G. Lubszynski. *Journal of Scientific Instruments*, v. 34, Mar. 1957, p. 81-89.

Writing speeds of 0.1μ sec. per picture element can be achieved; limiting resolutions range from 400 to 2000 lines. Improved performance and sensitivity may be obtained by incorporation of an electron multiplier.

8463 Improving the Linearity of Barrier-Layer Photocells. D. G. Wyatt. *Journal of Scientific Instruments*, v. 34, Mar. 1957, p. 106-108.

A modification whereby the effective series resistance of a barrier-layer photocell, in so far as it is constant, may be eliminated.

8464 A Soft Valve Scaler for Intermittent Fast Counting. G. W. Hutchinson. *Journal of Scientific Instruments*, v. 34, Mar. 1957, p. 109-110.

Information is stored during the bursts as charge on a condenser and is subsequently read off as pulses by discharging the condenser with a standard repetitive waveform.

8465 (English.) **Errors of Magnetic Deflection. I.** J. Haantjes and G. J. Lubben. *Philips Research Reports*, v. 12, Feb. 1957, p. 46-68.

The only error which can never be eliminated by a special field distribution is that known as curvature of the image field. This must be taken into account in the design of cathode-ray tubes for television purposes.

8466 (English.) **Storage of Injected Carriers at Surfaces of Germanium.** B. H. Schultz. *Philips Research Reports*, v. 12, Feb. 1957, p. 82-96.

Measurements of the relaxation of photoconductance in thin rods show that surface storage occurs and slows down the relaxation of photoconductance. It is particularly effective in thin rods of low resistivity in atmospheres where inversion layers are formed and at very low injection levels.

8467 (English.) **A New Approach to the Theory of Electrical Conductivity of Solids.** B. Meltzer. *Physica*, v. 23, Feb. 1957, p. 118-124.

Results are compared with those of Drude, Lorentz and Sommerfield, the latter being based on a solution of the Boltzmann equation of transport.

8468 One-Dimensional Treatment of the Effective Mass in Semiconductors. I. Adawi. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 789-792.

The energy band structure of a one-dimensional crystal is calculated using a Kronig-Penney model. Calculations for a specific average potential show that the effective mass increases monotonically with the potential asymmetry.

8469 Spectral Distribution of the Photomagnetoelectric Effect in Semiconductors: Theory. Wolfgang Gärtner. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 823-829.

A solution of the differential equations describing the photomagnetoelectric effect in semiconductors under small injection of arbitrary spatial distribution is derived for the infinite slab.

8470 Magnetoconductivity in *p*-Type Germanium. Colman Goldberg, E. N. Adams, and R. E. Davis. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 865-876.

Measurements of the Hall coefficient and resistivity were made as a function of magnetic field, temperature, and carrier concentration between 77 and 300 K.

8471 Effect of Impurities on Free-Hole Infrared Absorption in *p*-Type Germanium. R. Newman and W. W. Tyler. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 885-886.

Spectra are modified as the carrier and total impurity concentrations are increased. Observed effects are consistent with changes in the Fermi level and with nonvertical transitions induced by charged impurity centers.

8472 Properties of Gold-Doped Silicon. C. B. Collins, R. O. Carlson, and C. J. Gallagher. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1168-1173.

Measurements of temperature dependence of resistivity and Hall coefficient show an acceptor level at 0.54 e.v. from the conduction band and a donor level at 0.35 e.v. from the valence band. Distribution coefficient for Au in Si is 2.5×10^{-5}.

8473 Photoconductivity in Lead Selenide: Theory of the Dependence of Sensitivity on Film Thickness and Absorption Coefficients. James N. Humphrey and Richard L. Petritz. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1192-1197.

8474 Electronic Band Structure of Selenium and Tellurium. John R. Reitz. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1233-1240.

8475* (English.) **Electrical Properties of Nickel Doped Germanium at Low Temperatures.** Yasuo Kanai and Riro Nii. *Physical Society of Japan, Journal*, v. 12, Feb. 1957, p. 125-133.

The energy differences between Ni levels and the edges of conduction and valence bands are so large that the low temperature anomalous behavior was found in the temperature range of liquid air.

8476* The Periodic Solutions of the Differential Equation of a Resistance-Capacitance Oscillator. A. W. Gillies. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Feb. 1957, p. 101-121.

8477* Television Technique Applied to Observation and Control. J. D. McGee. *Society of Instrument Technology, Transactions*, v. 9, Mar. 1957, p. 26-43.

Fundamental physical principles of television signal generators. Modern pick-up tubes are described in detail.

8478* Radiation Suppression of Radar Pulses. Albert E. Hylas. *Sperry Engineering Review*, v. 10, Jan.-Feb. 1957, p. 22-26.

Derivation of the amount of shielding required for high voltage radar pulses; application to a typical radar modulator.

8479 A 40-Megacycle Scaler. Michiyuki Nakamura. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3585, Nov. 1956, 18 p. (UF767 U3u Contin.)

Scaler employs a fast flip-flop circuit of unique design. With techniques applied to fast trigger circuits, this circuit has been triggered at a rate higher than 50 Mc. per sec. and has a double-pulse resolution of 20 mμ sec.

8480 The Harmodotron—A Beam Harmonic, Higher Order Mode Device for Producing Millimeter and Submillimeter Waves. M. D. Sirkis. *University of Illinois (U. S. Atomic Energy Commission)*, AECU-3362, Sept. 1956, 223 p. (UF767 U3au Contin.)

A new method for the generation of relatively high powers at submillimeter wavelengths through the excitation of a single selected TM_{oms} mode in a cylindrical cavity is theoretically investigated by means of a field theory approach.

8481* Performance Characteristics of Barium Getters With Particular Reference to Their Application in Thermionic Valves. P. della Porta. *Vacuum*, v. 4, July 1954, p. 284-302.

Proposes to assess getter performance in terms of "instantaneous absorption capacity" expressed in liter micron per sec.

8482* Inexpensive High-Quality Amplifier. P. J. Baxandall. *Wireless World*, v. 63, Mar. 1957, p. 108 + 5 pages.

Design and construction of an amplifier rated to give five w. output. (To be continued.)

8483* The Short-Circuited Turn. Thomas Roddam. *Wireless World*, v. 63, Mar. 1957, p. 114-117.

Determining the conditions under which it may be harmful, useful, or just harmless.

8484* (German.) Inversion Boundary Layers of *p*-Silicon. **Inversionsrandschichten auf *p*-Silicium.** Siegfried Müller. *Zeitschrift für Naturforschung*, v. 12a, Feb. 1957, p. 112-122.

Preparation of samples. Measurements and their evaluation. Determination of surface conductivity from photoelectric curves.

8485* (Russian.) Effect of the External Electric Field on the Surface Recombination Rate. **K voprosu o vliianii vneshnego elektrostaticheskogo polia na skorost' poverkhnostnoi rekombinatsii v germanii.** V. P. Zhuze, G. E. Pikus, and O. V. Sorokin. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 23-29.

Two methods of studying the effect in a single crystal of Ge. The external electric field does not change the surface recombination rate. From this, consequences were deducted about the properties of the Ge surface.

8486* (Russian.) Some Peculiarities of the Electrical Properties of HgSe-HgTe Films. **Nekotorye osobennosti elektricheskikh svoistv plenok HgSe-HgTe.** O. D. Elpat'evskaia and A. R. Regel. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 45-50.

In HgSe-HgTe films, obtained by vacuum evaporation, only slight changes took place in the properties after exposure to air or steam. Depending on the temperature and transformation rate, transparent and non-transparent specimens formed.

See also: **8334** (junction transistors); **8906** (electrical properties of CdSb); **9202** (band pass filter design); **9237** (casting resins for electronic equipment); **9386** (transistor oscillator for tagging fish).

ENGINEERING ECONOMICS

8487 Some Economic Factors in Air Transportation. Theodore P. Wright. *Aeronautical Engineering Review*, v. 16, Apr. 1957, p. 45-51.

An estimate of future air traffic growth, with discussion of specific economic factors which justify such a forecast.

8488* Charting Steel's Progress. A Graphic Facts Book on the Iron and Steel Industry. 69 p. 1956. American Iron and Steel Institute, New York. (HD9515 Am35c Ref.)

Graphs illustrate data on raw materials, iron and steelmaking capacity, steel production, shipments of finished steel products, financial data, and wages. hours, and working conditions.

8489 Transitions in Soaps and Syndets. Foster D. Snell. *Chemical and Engineering News*, v. 35, Mar. 11, 1957, p. 106-110.

Syndets have risen to more than two-thirds of the soap and detergent market.

8490 The Chemical Industry in Europe. 211 p. 1956. Organisation for European Economic Co-operation, Paris. (HD9656 Or4c)

General trends in 1955 and 1956; the situation in individual countries during that time. Statistics on basic chemicals, petroleum chemicals, dyestuffs, paints, soaps, detergents, fertilizers, plastics, and sulfurous materials.

8491 Plastics—A Survey of a Fast Growing Canadian Industry. D. Keith Jackson. *Chemistry in Canada*, v. 9, Mar. 1957, p. 29-41.

Statistics on the Canadian plastics industry.

8492 Economic Development Abroad and the Role of American Foreign Investment. 35 p. 1956. Research and Policy Committee of the Committee for Economic Development. (HG4538 C73e Over.)

A statement of national policy.

8493 (Italian.) Information on the Economy of Southern Italy. **Notizie sull'economia del Mezzogiorno.** 123 p. 1956. Svimez, Associazione per lo svilluppo dell' Industria nell Mezzogiorno, Rome. (HC303 As78n)

A detailed study of the economic conditions in Southern Italy. After a survey of the population and various occupations, the natural conditions, the agricultural and industrial production was studied, as well as the application of recent programs, the agrarian reform, and the perspective for the future.

8494 World Petroleum Statistics. *Institute of Petroleum Review*, v. 11, Mar. 1957, p. 72-77.

World supply and demand statistics for crude petroleum; production of major refined products by countries; bunker oil deliveries to vessels engaged in international trade; estimated domestic demand for major products.

8495* Interspatial Relationships Affecting Air Travel. Samuel B. Richmond. *Land Economics*, v. 33, Feb. 1957, p. 65-73.

An analysis of the relationship between distance and volume of intercity air travel.

8496 Location and Space-Economy. Walter Isard. 350 p. 1956. Technology Press of Massachusetts Institute of Technology, Cambridge, Mass. (HD58 Is1L)

A general theory relating to industrial location, market areas, land use, trade, and urban structure.

8497 Report on Iron and Steel Scrap by the Department of Commerce Pursuant to Public Law 631, 84th Congress. 94 p. 1957. United States Government Printing Office, Washington, D. C. (HD9515 Un3.21r)

Conclusions from a comprehensive survey by Battelle Memorial Institute of U. S. ferrous scrap resources, as reported to the House Committee on Banking and Currency, 85th Congress.

8498 (Italian.) Research on the Economic Development of Southern Europe. Three Studies of the Economic Commission for Europe. (United Nations—Economic and Social Division). **Ricerche sullo sviluppo economico dell'Europa meridionale. Tre studi della commissione economica per l'Europa. (Nazioni Unite—Divisione economica e sociale).** 391 p. 1956. Svimez, Associazione per lo sviluppo dell' Industria nell Mezzogiorno, Rome. (HC240 As78r)

Written for the economist, this book contains studies about the development of some countries of Southern Europe, and about the special problems involved in locating and developing industrial regions. Economical and political tendencies of various agricultural, mining, and industrial sections, regional and economical development, location of industries, and development perspectives are considered.

8499 Sales Forecasting. Uses, Techniques, and Trends. 159 p. 1956. American Management Assn., New York. (HD28 AM35s Vis.)

Thirteen papers on objectives; finding and evaluating data; short-, medium-, and long-range forecasting; use of mathematics and company experiences.

8500* Statistical Year-Book of the World Power Conference. Frederick Brown, editor. v. VIII. 176 p. 1956. Percy Lund, Humphries & Co., Ltd., London. (TJ20 W89s)

Data on resources and annual statistics for 1952-1954 with some supplementary and revised statistics for earlier years and available statistics for 1955. Covers solid, liquid, and gaseous fuels, water power, and electricity.

8501 A Study of the Scientific Manpower Problem of the United States. 26 p. 1956. B. F. Goodrich Co., Akron. (LC1059 G62s Over.)

Outlines the nation's scientific and engineering manpower shortage with the hope that it will inspire action toward a solution on the part of businessmen, educators, and others. Extensive bibliography.

8502* Forecast of 1957 Paper Production. Louis T. Stevenson. *Tappi*, v. 40, Mar. 1957, p. 30A + 3 pages.

8503 Titanium. Arthur A. Pegau. 17 p. 1956. Commonwealth of Virginia, Dept. of Conservation and Development, Mineral Resources Circular No. 5. Charlottesville, Va. (TN799.T5 P34t Over.)

Historical and economic review of Ti operations in Virginia in light of the world market.

See also: **8340** (costs of pneumatic control systems); **8583** (Ohio coal resources); **9013** (cutting fabrication costs through control of scrap).

FLUID MECHANICS

8504 Rotational Waves in a Turbulent Liquid. R. V. L. Hartley. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 195-196.

Equations are derived for the propagation in a liquid, in a state of fine-scale turbulence, of a type of so-called transverse wave in which the elasticity is associated with the rotation of an element rather than with its shearing as in a solid.

8505 The Equations of Change and the Macroscopic Mass, Momentum, and Energy Balances. R. Byron Bird. *Chemical Engineering Science*, v. 6, Mar. 1957, p. 123-131.

Shows how the engineering Bernoulli equation containing the mechanical work term and the friction loss term may be obtained by a similar integration of the Navier-Stokes equation of motion for a viscous fluid over the volume of a flow system.

8506* (German.) Measurement of Flowing Materials. **Das messen strömender güter.** F. Cordes. *Chemiker-Zeitung*, v. 80, Apr. 20, 1956, p. 227-235.

Measurement of flow by velocity or volume meters. Newest flow measuring methods. Selecting measurement method with respect to exactness and economy.

8507* (French.) Homogeneous Turbulence Equations in the Presence of an Average Speed Field. **Sur les équations de la turbulence homogène en présence d'un champ de vitesse moyenne.** Antoine Craya. *Comptes Rendus*, v. 244, Feb. 11, 1957, p. 847-849.

A new study of the equation of evolution of double correlations in the homogeneous case. The equation of triple correlations was defined and emphasis put on the nature of two important terms.

8508* (Czech.) Turbulent Flow in the Gap Between Two Cylinders, the Inner of Which Rotates. **Turbulentní proudění v mezeře mezi dvěma válci, z nichž vnitřní rotuje.** Jan Polášek. *Elektrotechnický Obzor*, v. 46, Feb. 1957, p. 82-85.

Analyzes the flow of a viscous fluid in the gap between two concentric cylinders.

8509 Engineering Fluid Mechanics. Charles Jaeger. (Translated from the German by P. O. Wolf.) 529 p. 1956. Blackie & Son, London. (TC160 J17ttr)

Steady and unsteady flow theory; water hammer; ground-water flow. Empirical coefficients. Flow in beds.

8510* (German.) Detection of Refining of Lard. **Der Nachweis der Raffination von Schweineschmalz. III.** The UV-Absorption Spectrum. **Das UV-Absorptionsspektrum.** H. P. Kaufmann, J. G. Thieme, and F. Volbert. *Fette, Seifen, Anstrichmittel*, v. 58, Dec. 1956, p. 1046-1057.

The influence of origin, feeding of pigs, method of rendering, treatment, refining, and autoxidation on the absorption spectrum of lard between 220 and 300 mμ.

8511 Hydrodynamics. Horace Lamb. 6th Ed. 738 p. 1945. Dover Publications, New York. (QA911 L16h6)

Fundamental theorems, equations, and methods of solution. Topics include irrotational motion, motion of solids through a liquid, dynamical theory, vortex motion, tidal waves, surface waves, viscosity, and rotating masses of liquids.

8512* Heat Transfer in Pipe Flow at High Speeds. J. E. Bialokoz and O. A. Saunders. *Institution of Mechanical Engineers, Proceedings*, v. 170, no. 12, 1956, p. 389-406.

Conventional low-speed formulas for heat transfer and friction in pipe flow may be applied for gases flowing at speeds up to 1.6 times that of sound, provided that the effect of kinematic heating is allowed for by replacing the total fluid temperature by the adiabatic wall temperature in the Stanton number, and provided suitable correction is applied for the variation of fluid properties across the stream due to the finite temperature difference between the duct wall and gas.

8513* (Russian.) Studies of a Jet of Water Issuing From a Nozzle at a Pressure of 2,000 Atmospheres. **Nekotorye issledovaniia strui vody, vytekaiushchei iz sopla pod davleniem do 2000 atmosfer.** L. F. Vereshchagin, A. A. Semerchan, and F. M. Filler. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 57-60.

Studies made with the aid of a high-speed camera and temperature measurements. Heating of the water due to Joule-Thomson effects at a velocity of 600 m/sec. Suggests that there may be an upper limit to the velocity which can be attained, when the velocity increases beyond a certain limit the water will turn to steam because of the Joule-Thomson effect.

8514 Investigation of Local Laminar Heat Transfer on a Hemisphere for Supersonic Mach Numbers at Low Rates of Heat Flux. I. Korobkin and K. H. Gruenewald. *Journal of the Aeronautical Sciences*, v. 24, Mar. 1957, p. 188-194.

8515 Velocity, Temperature, and Heat-Transfer Measurements in a Turbulent Boundary Layer Downstream of a Stepwise Discontinuity in Wall Temperature. D. S. Johnson. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 2-8.

8516 A Theoretical Analysis of the Viscous Flow in a Narrowly Spaced Radial Diffuser. Henry W. Woolard. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 9-15.

Development of a theoretical method for calculating the radial pressure distribution for laminar viscous flow in a narrowly spaced radial diffuser having arbitrarily shaped walls deviating only moderately from a plane surface.

8517 A New Method to Measure Prandtl Number and Thermal Conductivity of Fluids. E. R. G. Eckert and T. F. Irvine, Jr. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 25-28.

Method is based on the fact that a well-established, unique relation exists between the Prandtl number and the recovery factor for laminar high-velocity boundary-layer flow.

8518* (Russian.) Unsteady Motion of a Viscous Incompressible Fluid in a Narrow Slit of Constant Breadth in the Presence of Heat Transfer. **Ploskoe neustanovivsheesia dvizhenie viazkoi neszhimaemoi zhidkosti pri nalichii teploobmena.** L. A. Philippova. *Leningradskogo, Universiteta, Vestnik, Seriia Matematiki, Mekhaniki i Astronomii*, v. 12, no. 1, 1957, p. 141-151.

8519 Heat Transfer Rates for Gases. Frank L. Rubin. *Petroleum Refiner*, v. 36, Mar. 1957, p. 226-228.

Correction factors for tube thickness and properties of the gas are considered in graphical solution method.

8520 The Reflection and Transmission of Shock Waves. I. The Reflection of a Detonation Wave at a Boundary. II. The Effect of Shock Waves on an Elastic Target of Finite Thickness. D. C. Pack. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 183-195.

8521* (English.) **On Hypersonic Viscous Flow Past a Flat Plate With Suction or Injection.** Michiru Yasuhara. *Physical Society of Japan, Journal*, v. 12, Feb. 1957, p. 177-182.

Numerical examples show that injection increases height of shock wave, thickness of boundary layer, and pressure on the plate. Only the velocity profile in the boundary layer is effected by suction.

8522* Flow With Variable Shear Past Circular Cylinders. J. D. Murray and A. R. Mitchell. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Feb. 1957, p. 13-23.

The stagnation streamline is displaced in the free stream towards a region of higher velocity. Displacements obtained from "linear" and "boundary layer" type shear are comparable in magnitude to values obtained in the constant shear case.

8523* Two-Dimensional Contracting Duct Flow. J. C. Gibbings and J. R. Dixon. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Feb. 1957, p. 24-41.

A contraction of finite length must be carefully designed so as to avoid infinite adverse wall velocity gradients.

8524* The Accurate Calibration of Flow-Meters With Water. E. A. Spencer and A. T. J. Hayward. *Society of Instrument Technology, Transactions*, v. 9, Mar. 1957, p. 1-12.

Discusses a pilot system for measuring flow rates up to 0.8 cu. ft. per sec. and a main system for measured rates up to 30 cu. ft. per sec. based on direct weighing.

8525 Effect of Surface Mobility on Gas Phase Transport Through Porous Media. Edwin N. Lassettre. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, K-1221, Feb. 1957, 15 p. (UF767 Un3.1k Contin.)

Effect depends on particle size of the porous medium and is greatest at small particle sizes. The largest factor by which the permeability of a bed of spheres can be altered is 13/9 and the permeability increases with increase in surface mobility.

8526 The Problem of Knudsen Flow. III. Solutions for One-Dimensional Systems. W. C. DeMarcus. *Union Carbide Nuclear Company (U. S. Atomic Energy Commission)*, K-1302, pt. 3, Mar. 1957, 50 p. (UF767 Un3.1k Contin.)

Mathematical analysis.

8527 A Study of Sprays Formed by Two Impinging Jets. Marcus F. Heidmann, Richard J. Priem, and Jack C. Humphrey. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3835, Mar. 1957, 32 p. (TL570 Un3t)

At low velocities the spray pattern was a smooth sheet completely surrounded by a liquid rim. At higher jet velocities a fully developed spray was produced which was characterized by waves of drops. Frequency of the waves increased with increased injection velocity and decreasing impingement angle.

8528 Theory of Free-Molecule, Orifice-Type, Pressure Probes in Isentropic and Nonisentropic Flows. G. N. Patterson. *University of Toronto, Institute of Aerophysics, UTIA Report No.* 41, Nov. 1956, 15 p. (TL570 T64.84a Vis.)

Theory suggests the use of such probes for detailed study of boundary layer and shock transition.

8529 Effects of Probe Size on Measurements in a Laminar Boundary Layer in Supersonic Flow. G. R. Ludwig. *University of Toronto, Institute of Aerophysics, UTIA Technical Report No.* 9, Nov. 1956, 22 p. (TL570 T64.84t Contin.)

Bow shock of the probe distorts and possibly separates the boundary layer being measured. Degree of the distortion varies with vertical position, shape, and size of the probe tip.

See also: **9174** (sound reflection by moving fluids); **9225** (heat transfer in fluid flow); **9284** (flow in a cyclone separator); **9292** (flow of rubber latex).

FOOD TECHNOLOGY

8530 Advances in Food Research. E. M. Mrak and G. F. Stewart, editors. v. VII. 404 p. 1957. Academic Press, New York. (TP370 Ad95 Vis.)

Consists of seven critical reviews including flavor analysis, fish spoilage, spoilage microorganisms, chlorine in sanitation, and freeze-drying of foods.

8531* Quality and Cost of Conventional vs. Premix Cakes. Larue Hefner. *American Dietetic Association, Journal,* v. 33, Mar. 1957, p. 233-237.

Mix cakes were considered superior to conventional institutional cakes.

8532* Studies on the Preservation of Fresh Apple Juice With Sorbic Acid. W. E. Ferguson and W. D. Powrie. *Applied Microbiology,* v. 5, Jan. 1957, p. 41-43.

Fresh, unpasteurized apple juice containing 0.035% sorbic acid and approximately 50 mg. ascorbic acid per 100 ml. of juice may be preserved without refrigeration for a minimum period of two weeks with little loss of flavor or quality.

8533* The Recovery of Pectin From Orange Peel Extracts as Aluminum Pectinate. G. De Luca and M. A. Joslyn. *Food Technology,* v. 11, Mar. 1957, p. 137-141.

Aluminum chloride gave better recovery and formed pectinates of lower ash content than did $Al_2(SO_4)_3$. Rapid addition of $AlCl_3$ resulted in higher recovery than slow additions.

8534* Flavor Permeability in Food Packaging and Its Evaluation. M. Karel, B. E. Proctor, and A. Cornell. *Food Technology,* v. 11, Mar. 1957, p. 141-145.

The proposed permanganate procedure offers a rapid and accurate method for comparison of different materials from the point of view of their permeability to organic vapors.

8535* Use of High-Voltage Cathode Rays to Destroy Bacteria of the *Salmonella* Group in Liquid and Frozen Egg White and Egg White Solids. J. T. R. Nickerson, S. E. Charm, R. C. Broglé, E. E. Lockhart, B. E. Proctor, and Hans Lineweaver. *Food Technology,* v. 11, Mar. 1957, p. 159-166.

Salmonella was more resistant to irradiation in dried egg white products than in liquid or frozen egg white. An irradiation dose causing a 10^7-fold reduction in *Salmonella* organisms in egg white products causes only minor deteriorations in the functional and organoleptic properties of these products.

8536* Effect of Gamma Irradiation on Cake Mixes at High and Low Moisture Levels. Howard E. Bauman, Helen Baeder, Jolyon A. Stein, C. G. Harrel, and R. A. Larsen. *Food Technology,* v. 11, Mar. 1957, p. 193-196.

8537 Food Storage Effects, Changes in Light Reflectance and Ascorbic Acid Content of Foods During Frozen Storage. N. B. Guerrant. *Journal of Agricultural and Food Chemistry,* v. 5, Mar. 1957, p. 207-212.

Tests at 10, 0, and −20 F showed that the greatest change in reflectance and vitamin content occurred in foods stored at the higher temperatures. Changes in the reflectance seemed to parallel changes in ascorbic acid content.

8538 The Decolorization of Sugar Liquor by Bone Charcoal. H. M. Thompson, G. J. Rayner, S. Hill, and H.C.S. de Whalley. *Journal of Applied Chemistry,* v. 7, Feb. 1957, p. 49-63.

Kinetics of the refining of sugar solutions with bone charcoal, especially as regards the effect of particle size of the charcoal, and the settled volume time, color density, and ash content of the liquor.

See also: **7941** (Preservation of food by ionizing radiation); **9083** (radiation sterilization of meat).

FUELS AND COMBUSTION

8539* (Spanish.) The Industrial Combustion Furnace. The Furnace is a Laboratory. **Hornos industriales de combustión. Laboratorio del horno.** Enrique Borras Brucart. *Acero y Energia,* v. 14, Jan.-Feb. 1957, p. 35 + 6 pages.

Principles and structural features of various types of furnaces. Theoretical considerations of heat generation and transfer to the substance being heated.

8540 Design of an Apparatus for the Measurement of the Combustibility Hazard of Gases in Aircraft and Other Applications. Enoch J. Durbin. *Aeronautical Engineering Review,* v. 16, Apr. 1957, p. 58-63.

Use of a hot Pt-wire combustibility detector in a continuous sampling process, providing measurement of the per cent of the lower explosive limit of mixtures at concentrations well below the lower explosive limit.

8541 Some Basic Principles of Pulverization and Preparation of Coking Coal Blends. A. H. Brisse and H. E. Harris. *Blast Furnace and Steel Plant,* v. 45, Mar. 1957, p. 301-307.

The heterogeneous nature of coal is responsible for the fact that some coals must be pulverized more thoroughly than others if maximum coking strength is to be obtained.

8542* (German.) Chemical Processes in the Combustion Chambers of Slagging Boilers. **Chemische Umsetzungen im Feuerraum der Schmelzkammerkessel.** K. Wickert. *Brennstoff-Wärme-Kraft,* v. 9, Mar. 1957, p. 105-118.

Concludes that corrosion in slagging chambers can be prevented only by purposive construction of the burners.

8543* (German.) Dew-Point of Flue Gas and Flue Gas Corrosion. **Rauchgastaupunkt und Rauchgaskorrosionen.** W. Gumz. *Brennstoff-Wärme-Kraft,* v. 9, Mar. 1957, p. 118-125.

8544* (German.) Results of Measurements of Dew-Points in Flue Gases. **Ergebnisse von Taupunktmessungen an Rauchgasen.** H. Rögener. *Brennstoff-Wärme-Kraft,* v. 9, Mar. 1957, p. 126-128.

Determines the concentration of H_2SO_4 in the flue gases and the velocity of corrosion when the temperature drops below the dew-point.

8545* (French.) Effect of the Walls on the Ignition Ranges of Butane and Air Mixtures at Low Pressure. **Influence des parois sur les domaines d'inflammabilité des mélanges de butane et d'air aux basses pressions.** Gisèle Dalmai, Ralph Delbourgo, and Paul Laffitte. *Comptes Rendus,* v. 244, Feb. 11, 1957, p. 897-899.

Tests were made with n-C_4H_{10} and air at pressures lower than 1 atm. and showed that the retrogression point of the curve defining the inflammability range is independent from the chemical nature of the wall, although this has a definite effect on the H_2O_2 in burned gases.

8546 Surface Effects in Combustion Reactions. I. Effects of Wall Coating on the $H_2 + O_2$ Reaction. II. Activity of Surfaces Towards Some Possible Chain-Carriers and Combustion Intermediates. D. R. Warren. *Faraday Society, Transactions,* v. 53, Feb. 1957, p. 199-209.

8547* (French.) The Temperatures of Hydrogen-Chlorine Flames. **Températures des flammes hydrogène-chlore.** Ch. Barthel. *Génie Chimique (Supplement to Chimie & Industrie),* v. 77, Feb. 1957, p. 34-36.

Data are computed as a function of the initial composition.

8548* An Effort to Use Laboratory Test as an Index of Combustion Performance. F. J. Ceely and R. I. Wheater. *Heat Engineering,* v. 32, Jan.-Feb. 1957, p. 8-15.

The reactivity index, or temperature at which the oxidation rate attains a prescribed value under standard conditions, is correlated with combustibility and other fuel properties. Data from 20 fuel analyses are reported.

8549 Carbonization of Agglomerating Coals in a Fluidized Bed. E. W. Lang, H. G. Smith, and Carl Bordenca. *Industrial and Engineering Chemistry,* v. 49, pt. 1, Mar. 1957, p. 355-359.

In a pilot plant program for a continuous, fluidized-bed process for low-temperature carbonization of Alabama coking coals, agglomeration was best overcome by internal blending of raw coal with a stream of at least ten parts of hot char. Heat was provided by internal combustion of char with air.

8550 Kinetics of Carbon Gasification. C. W. Zielke and Everett Gorin. *Industrial and Engineering Chemistry,* v. 49, pt. 1, Mar. 1957, p. 396-403.

An empirical correlation for predicting differential rates of carbon gasification and methane formation can be used for interpreting pilot runs and extrapolating pilot design to commercial scale.

8551 The Determination of Sulphur Trioxide in Flue Gases. I. R. A. Mott and K. Parramore. *Institute of Fuel, Journal*, v. 30, Mar. 1957, p. 123-126.

The Corbett-Flint method was modified and applied to an investigation of the effect of various factors on the production of SO_3 in a coke-fired domestic boiler. Preliminary results suggest an increase in the concentration of SO_3 with increase in the rate of combustion.

8552 The Radiation From Flames in a Small-Scale Oil-Fired Furnace. D. K. Holliday and M. W. Thring. *Institute of Fuel, Journal*, v. 30, Mar. 1957, p. 127-136 + 1 plate.

Flame emissivity and temperature were measured along the length of a turbulent jet diffusion flame in a small experimental furnace for flames from 14 liquid hydrocarbon fuels covering a wide range of chemical composition.

8553* Assessment of Coals for Industrial Use: Some Current Investigations Into the Properties and Characterization of Australian Coals. H. R. Brown. *Institute of Fuel, Journal*, v. 30, Mar. 1957, p. 137-159 + 3 plates.

8554 Combustion and Detonation in Gases. B. Greifer, J. C. Cooper, F. C. Gibson, and C. M. Mason. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 289-294.

Detailed streak schlieren photographs elucidate the mechanism of initiation and the structure of detonation waves.

8555 Spectroscopic Survey of Energy Distributions of OH, C_2, and CH Radicals in Low Pressure Acetylene-Oxygen Flames. Herbert P. Broida and Donald F. Heath. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 223-229.

8556* (Russian.) Research on Coal Constitution: Its Purpose and Present Status. **Tsil' i danashn'a dostignucha ispitivan'a sastava ugl'a.** I. G. C. Dryden. *Khemiskog Drushtva Beograd, Glasnik*, v. 21, no. 4, 1956, p. 229-250.

Reviews current progress in Great Britain.

8557 Coking Properties of Pittsburgh District Coals. F. W. Smith, D. A. Reynolds, and D. E. Wolfson. *Mining Engineering*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Mar. 1957, p. 360-364.

Coke tumbler stability and hardness form a reasonable basis for predicting the strength of cokes.

8558 Radio-Frequency Carbonization. J. W. Taylor. *Research*, v. 10, Mar. 1957, p. 108-115.

The ability of R.F. heating to give absolutely uniform temperature distribution and rates of temperature rise permits a precise study of the individual stages in the plastic zone and hence a clearer understanding of the coking process.

8559 (Italian.) Present Knowledge of the Physical and Chemical Structure of Coal and Its Formation. **Attuali conoscenze sulla struttura fisica e chimica del carbone e sulla sua formazione.** C. Manci. *Revista dei Combustibili*, v. 11, Jan. 1957, p. 42-60.

Physical and chemical structures of coal, lignite, and coke. Coking processes and products.

8560* A Contribution to Flame Theory. G. Klein. *Royal Society of London, Philosophical Transactions*, v. 249, ser. A, Feb. 1957, p. 389-415.

Equations of a reacting gas mixture and their application to flames. The general one-dimensional flame problem.

8561 Carbon Formation in Diffusion Flames and the Role of Acetylene. D. J. Cole and G. J. Minkoff. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 280-287.

Spectroscopic study of methane, ethane, ethylene, propane, and butane indicates that acetylene is not an important intermediate in the formation of C in hydrocarbon diffusion flames.

8562 (Swedish.) A Study Trip to the Soviet Union, June 23-July 15, 1955. **Studieresa till sovjetunionen den 23 juni-15 juli 1955.** 108 p. 1955. A. B. Svensk. Torvförädling, Sweden. (TN840.R9 Sv25s Over.)

The trip was taken by leading members of the Swedish Peat Processing Co. in order to study the Soviet Peat Industry's methods and machines, and to discuss the possibility of delivery of Russian machines to Sweden. After a general survey of the Peat Industry in the USSR, the authors give their impressions together with tables, maps, and pictures, of their visits to various factories, fields, and centers for the processing, study, or application of peat.

8563 Theoretical Considerations on the Combustion of Carbon. E. F. M. Van Der Held. 80 p. Central Technical Institute, Delft, Holland. (QD516 V28t Over.)

Pressure and temperature distributions in the laminar and reaction zones; surface temperatures under 1400 K; presence of water vapor in the gases.

8564 Combustion of Solid Fuels in Thin Beds. E. P. Carman, E. G. Graf, and R. C. Corey. *U. S. Bureau of Mines Bulletin*, 563, 1957, 92 p. (TN21 Un36)

Tests were run with traveling-grate stokers and crossfeed beds. Factors studied included the time required for initial ignition of the surface of the fuel bed by heat transferred by radiation, determination of the absolute radiant heat received by the fuel, travel of ignition through the bed, and burning after ignition reached the grate.

8565 Low-Temperature Tar From Fluidized Carbonizing Reactors. Manuel Gomez, John B. Goodman, and V. F. Parry. *U. S. Bureau of Mines, Report of Investigations* 5302, Feb. 1957, 44 p. (TN21 Un3r)

Analytical data covering 20 low-temperature tars produced in an externally heated pilot-plant-scale retort.

8566 Carbonizing Properties of Indiana County, Pa., Coals. D. E. Wolfson, G. W. Birge, and B. W. Naugle. *U. S. Bureau of Mines, Report of Investigations* 5314, Feb. 1957, 18 p. (TN21 Un3r)

These coals will produce coke of satisfactory strength for metallurgical use, but the variability of their chemical and expanding properties must be considered. Yields of coke and tar plus light oil were normal for the fixed-carbon content.

See also: **8041** (cleaning coke oven gas); **8527** (impinging jet sprays); **8602** (flame propagation in gases).

GEOLOGY, GEOPHYSICS, MINERALOGY, AND MINING ENGINEERING

8567* Estimation of the Heat Transfer Coefficient Between Air and the Ground Surface. Ronald F. Scott. *American Geophysical Union, Transactions*, v. 38, Feb. 1957, p. 25-32.

For the purposes of programming a computer to predict the depths of freezing and thawing in soils, a simple method is outlined with the appropriate charts for calculating the value of the surface heat-transfer coefficient, based on meteorological information which is normally easily obtainable.

8568 Radiation Minimum Temperatures. Francis K. Davis, Jr. *American Journal of Physics*, v. 25, Mar. 1957, p. 150-152.

Experimental evidence showing value of a radiation device for predicting freezing temperatures at vegetation level.

8569 Study of Sky and Aurora. (From the Program of the International Geophysical Year). V. I. Krasovski. *Canada. Defence Scientific Information Service No.* T-224 R, Aug. 1956, 4 p. (Translated from *Vestnik Akademii Nauk*, no. 5, 1956, p. 29-31.)

Russian research during the International Geophysical year will include the synoptic reporting of auroras, plus regular electrophotometry and spectrography of the sky luminescence and the aurora.

8570 Multiple Scattering in the Infrared Region of the Spectrum. F. F. Yudalevich. *Canada. Directorate of Scientific Information Service, Translation T* 239 *R*, Jan. 1957, 3 p. (From *Akademiia Nauk SSSR. Izvestiia. Geophysical Series*, no. 7, p. 862-864. 1956.)

Numerical data show that even in the near part of the infrared spectrum the effect of multiple scattering is small, thus opening up the possibility of virtually eliminating the effect of multiple scattering in the solution of problems in atmospheric optics.

8571 A Fast Auroral Camera. R. Montalbetti. *Canadian Journal of Physics*, v. 35, Mar. 1957, p. 280-283 + 2 plates.

Camera photographs and auroral display at a speed of one or more frames per sec. The fast optical system and wide angular field of view are obtained with an f/0.71 objective and a spheroidal mirror.

8572* (French.) Chemical Determination of Atmospheric Ozone. **Sur le dosage chimique de l'ozone atmosphérique.** Olga Tanaevsky and Arlette Vassy. *Comptes Rendus*, v. 244, Feb. 11, 1957, p. 924-925.

Comparative tests showed that the presence of nitrogen peroxide in the air does not cause any error in the chemical determination of ozone.

8573* Ground Temperature Investigations in Canada. C. B. Crawford and R. F. Legget. *Engineering Journal*, v. 40, Mar. 1957, p. 263 + 7 pages.

8574 Gaseous Nebulae. L. H. Aller. v. III. 322 p. 1956. John Wiley & Sons, New York. (QB855 AL54g)

Types; methods of observation; physical processes; structure and internal motions.

8575* (Italian.) Where Is Oil to Be Found? **Dove si trova il petrolio.** Dante Jaboli. *Illustrazione Scientifica*, v. 9, Mar. 1957, p. 22-29.

Geological conditions necessary for the presence of oil deposits; underground reservoirs; nature of the upper stratum; stratigraphical traps.

8576 The Hydraulics of Drilling Mud Flow With Particular Reference to Annular Flow and Caving Hole Difficulties. P. W. Cooke. *Institute of Petroleum, Journal*, v. 43, Mar. 1957, p. 69-85.

Calculations involving the problem of removing caved debris from a well bore demonstrate that turbulent flow in the annulus is desirable.

8577 Solar Radiation and Atmospheric Attenuation at 6-Millimeter Wavelength. Robert N. Whitehurst, Jack Copeland, and F. H. Mitchell. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 295-298.

Total vertical attenuation in the earth's atmosphere on four clear summer days averages 1.2 db. Attenuation in clouds is highly variable. An additional 1 db above the fair-weather value is typical for a thin overcast. An effective solar temperature of about 4500 K was found.

8578* Temperatures in the Earth's Interior. J. J. Gilvarry. *Journal of Atmospheric and Terrestrial Physics*, v. 10, Feb. 1957, p. 84-95.

Fusion temperatures are evaluated for the earth's mantle from Lindemann's law by use of elastic parameters determined for a given depth from seismic data.

8579* Recombination in the Ionosphere During an Eclipse. D. R. Bates and M. R. C. McDowell. *Journal of Atmospheric and Terrestrial Physics*, v. 10, Feb. 1957, p. 96-102.

The minimum electron concentration in a layer containing two species of ion is reached sooner after totality than it is in the case of a layer which decays to the same extent but which contains only one species of ion.

8580* An Approach to Quantitative Precipitation Forecasting. M. A. Estoque. *Journal of Meteorology*, v. 14, Feb. 1957, p. 50-54.

A quantitative method of predicting precipitation due to large-scale vertical motions. Solutions are obtained by graphical procedure which enables one to obtain a 24-hr. forecast in about 2-hrs. for an area comparable to the size of North America.

8581 The Motions and Interactions of Bodies. Readings, Notes, and Queries. 4th Rev. Ed. 232 p. 1956. University of Chicago Press, Chicago. (QC131 C43m4)

Text for a beginning course in the natural sciences consists largely of selections from, and analysis of, original source material on the motion of falling bodies, motions of the earth and heavenly bodies, Newton's science of motion and system of the world, and the conservation of energy.

8582 Ice-Forming Nuclei. B. J. Mason and J. Hallett. *Nature*, v. 179, Feb. 16, 1957, p. 357-359.

Silver iodide, Pb I, and Cu S are efficient ice-forming nuclei up to −5, −6, and −7 C, respectively. Other substances becoming active at about −15 C include crystalline I, CuI, and V_2O_5.

8583 Coal Resources of the Lower Part of the Allegheny Formation in Ohio. Richard M. DeLong. *Ohio Division of Geological Survey, Report of Investigations No.* 31, 1957, 43 p. (QE151 Oh3re Vis.)

8584 Atmospheric Transmission in the Infrared. J. H. Taylor and H. W. Yates. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 223-226.

Transmission from 0.5μ to 15μ is shown as measured over three horizontal paths of 1000 ft., 3.4 statute miles, and 10.1 statute miles during a relatively clear winter day, a moderately dense fog, and a snowstorm.

8585 (English.) **Cosmic Ray Stars in Nuclear Emulsions at the Equator and at High Altitude.** B. Jongejans, F. Schurink, and D. J. Holthuizen. *Physica*, v. 23, Feb. 1957, p. 164-168.

Results are reported for an experiment performed at 4840 meters above sea-level and 0° latitude.

8586 Crucial Experiment Concerning the Origin of Meteorites. S. F. Singer. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 765-766.

It is suggested that the He^3:He^4 ratio of iron meteorites be measured after the samples have been heated. Results may be of value in dating breakup of the meteorite's parent planet as well as for estimating the value of the prehistoric cosmic-ray flux.

8587 Submarine-Gravity Measurements in the Atlantic Ocean, Indian Ocean, Red Sea and Mediterranean Sea. R. W. Girdler and J. C. Harrison. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 202-213.

Results of 58 gravity measurements.

8588 The Age of the Solar System. Harrison Brown. *Scientific American*, v. 196, Apr. 1957, p. 80 + 9 pages.

Rocks and meteorites contain radioactive elements and the products of their decay, the laborious analysis of which presently indicates that the earth and its neighbors were formed 4.5 billion years ago.

8589 Sun Clouds and Rain Clouds. Walter Orr Roberts. *Scientific American*, v. 196, Apr. 1957, p. 138 + 7 pages.

About once a month the earth collides with a cloud of corpuscles ejected by the sun. There is new evidence that these corpuscles, impinging on the earth's atmosphere affect the weather.

8590 Solar, Geomagnetic, and Ionospheric Phenomena as Indices of Solar Activity. Frederick W. Ward, Jr. *U. S. Air Force, Cambridge Research Center, Technical Report, AFCRC-56-213*, Nov. 1956, 76 p. (TK7800 Un3.12b Contin.)

A number of possible measures of solar variability are studied to establish the degree of their interrelationship, and the availability, reliability, and usefulness of the data published concerning them.

8591* Weight Dropping, a Practical Seismic Tool on Land or Water. Alan Waldie. *World Petroleum*, v. 28, Mar. 1957, p. 56 + 4 pages.

Dropping a 6,000-lb. weight from a height of only 9-ft. in certain difficult areas has produced vertical energy records at costs below conventional seismic methods.

8592* Geopac, an Automatic Plotter and Computer for Seismic Geophysical Data. L. M. Mott-Smith, W. J. Gundlach, and G. C. Phillips. *World Petroleum*, v. 28, Mar. 1957, p. 76-78.

Most important contribution to the seismic prospecting technique may be expected in the presentation of corrected data in a cross-section in which relative distances are preserved.

See also: **7891** (erosion of meteors in upper atmosphere); **8053** (analysis of rocks); **8503** (Ti mineral reserves); **8736** (effect of sunlight on seawater); **9091** (cosmic ray spectrum); **9301** (mine ventilation).

GRAPHIC ARTS

8593* Photocopying: Technique and Preparation of Material. Albert Levin. *Biological Photographic Association, Journal*, v. 24, Feb. 1956, p. 3-12.

8594* (French.) Experimental Study of the Spectrum of the Local Transparency of a Photographic Film With a Uniform Image. **Étude evpérimentale du spectre de la transparence locale d'un film photographique uniformément impressionné.** Michel Savelli. *Comptes Rendus*, v. 244, Feb. 11, 1957, p. 871-873.

Measures of the spectrum density of the local transparency were given. The tests were conducted to extend the range of measurement towards some low frequencies at which the density seems almost constant and then decreases in a uniform way.

8595* The Use of 35/32 mm. Films for the Production of 16 mm. Black-and-White or Color Prints. William E. Gephart, Jr. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Mar. 1957, p. 97-100.

Outlines a successful method of using 35/32 films for the production of 16 mm. prints. Advantages are listed.

8596* Combination Printing of 35/32 mm. and 16 mm. Films. C. J. Williams and A. L. Ford, Jr. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Mar. 1957, p. 100-101.

8597* Automatic Film Inspection. Robert Grunwald and Richard R. Wallace. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Mar. 1957, p. 116-119.

A system of inspection which has a higher degree of speed and accuracy then manual methods.

8598* Absolute Measurement of Signal Strength on Magnetic Recordings. II. Robert Schwartz. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Mar. 1957, p. 119-122.

A method was found to be practical for determining the surface induction for signals recorded on 16 mm. magnetic-coated film.

8599* A High-Intensity Electronic Light Source for High-Speed Cameras. William C. Griffin. *Society of Motion Picture and Television Engineers, Journal*, v. 66, Mar. 1957, p. 127-129.

Methods of obtaining a series of reflected light photographs of projectiles penetrating metallic plates.

See also: **7975** (photographing immunological reactions); **8571** (auroral camera); **8621** (preparaton of slides); **8633** (X-ray photography); **9125** (photographic techniques in work study); **9170** (acoustic-optical images on photographic plates).

HEAT POWER

8600* Thermal Problems of Atomic Power Stations. II. C. E. Lundgren and C. Seippel. *Brown Boveri Review*, v. 43, Dec. 1956, p. 515-524.

Conditions for the most favorable steam- or gas-turbine cycle when the upper and lower temperature limits of the reactor coolant are given. The efficiencies of such cycles are given by curves.

8601* (Italian.) The Cooling Process in Periodic Equipment. Heat Exchangers. Economic Size of the System. Operating Costs. **Il raffreddamento nelle apparecchiature discontinue. Scambi termici. Dimensionamento economico dell'impianto. Costi di esercizio.** Ugo Fasoli. *Chimica e l'Industria*, v. 39, Feb. 1957, p. 83-92.

A formula is derived giving the cooling time in noncontinuous equipment as a function of the initial and final temperatures of the liquid to be cooled, the temperature of the cooling liquid and other known constants. Economic considerations and choice among the cooling substances such as water, brine, or vapor.

8602* (Russian.) On the Limit of Stable Flame Propagation in Gases at Variable Pressure. **O predelakh ustoichivogo rasprostraneniia plameni v gazakh pri izmeniaiushchemsia davlenii.** D. I. Abugov. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 86-89.

A theoretical study of various occurrences in motor combustion and a solution of some problems linked with the limit of stable operation of reciprocating engines using spark ignition of lean mixtures.

8603 Improving Gas Turbine Performance. III. Cooling Turbine Blades. F. J. Bayley and N. Bell. *Engineering*, v. 183, Mar. 8, 1957, p. 300-302.

Heat transfer characteristics of a liquid metal in a closed thermosyphon.

8604* (Czech.) Technical and Economic Aspects of Recuperators. **Technicko-hospodářské charakteristiky rekuperátorů.** Rudolf Kremer. *Hutník*, v. 6, Nov. 1956, p. 324-329.

Principles; classification by material of which the checker work is made; advantages and disadvantages of the various types; choice of recuperators.

8605* A Standard Gas Turbine to Burn a Variety of Fuels. G. B. R. Feilden, J. D. Thorn, and M. J. Kemper. *Institution of Mechanical Engineers, Proceedings*, v. 170, no. 20, 1956, p. 665-696 + 2 plates.

Development of special types of "kinematic" construction suitable for accommodating the very large temperature changes encountered when a gas turbine is started and put on load rapidly. Development of combustion chambers to burn fuels ranging from natural gas and gas oil to residual oils, coal tar, and peat.

8606* (French and German.) Insulation and Protection of Superheated Steam Piping. **Isolation et protection des conduites de vapeur surchauffée.** *Pro-Metal*, v. 10, Feb. 1957, p. 785-789.

Copper foil, 0.3 to 0.5 mm. thick, is used for pipe wrapping material.

8607 (Czech.) Utilizing the Slag Heat for Preheating the Feeding Water. **Využití tepla ze strusky k výrobě přídvané vody.** R. Doležal. *Strojírenstvi*, v. 7, Feb. 1957, p. 93-97.

Deals with an installation designed to minimize heat losses in the slag.

8608 (Czech.) Condensation of Steam Containing Inert Components. **Kondensace páry za přítomnosti nekodensujících plynů.** F. Kadeřávek. *Strojírenství*, v. 7, Feb. 1957, p. 99-105.

Differences between surface and spray condensation are discussed together with the heat balance and changes in the composition of gases.

8609 (Czech.) Simplified Method for Calculating the Heatting Surfaces at Low Combustion Product Temperatures. **Výpočet výhřevných ploch při nízkých teplotách spalin.** Jiří Pössner. *Strojírenství*, v. 7, Feb. 1957, p. 107-111.

How to find the qualities necessary for designing the heating surface which can be applied to tube boilers.

8610* (French.) Rocket Engines. **Propulseurs-fusées.** Fernand Florio. *Technique et Science Aéronautiques*, v. 6, no. 6, 1956, p. 275-280.

A study of rocket engines in relation to their cycle and heat consumption, their combustion intensity and calorific flow, temperature and pressures of combustion, and their fuels.

8611* (English.) **On the Atomizing Characteristics of Injectors for Diesel Engines.** Yasusi Tanasawa and Syoitiro Toyoda. *Technology Reports, Tôhoku University*, v. 21, no. 1, 1956, p. 117-145.

Both the immersion-liquid and molten wax methods were used to measure size of drops intermittently injected from various types of nozzles.

8612 Investigation of Noise Field and Velocity Profiles of an Afterburning Engine. Warren J. North, Edmund E. Callaghan, and Chester D. Lanzo. *U. S. National Advisory*

Committee for Aeronautics, Research Memorandum E54G07, Sept. 1954, 23 p. (TL782 Un3rm Vis.)

Sound pressure levels, frequency spectrum, and jet velocity profiles for an engine-afterburner combination at various values of afterburner fuel-air ratio.

8613 Some Measurements of Noise From Three Solid-Fuel Rocket Engines. Leslie W. Lassiter and Robert H. Heitkotter. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3316, Dec. 1954, 21 p. (TL570 Un3t)

Frequency spectra for the range 20 to 15,000 c.p.s. indicate that the noise of each rocket is random, with a spectrum envelope which peaks in the lower part of the audible range.

8614 Comparison of NACA 65-Series Compressor-Blade Pressure Distributions and Performance in a Rotor and in Cascade. Willard R. Westphal and William R. Godwin. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3806, Mar. 1957, 53 p. (TL570 Un3t)

Entering and leaving flow velocities, pressure rise, and the pressure distribution on the rotating blades were measured at three radial stations of a free-vortex rotor.

8615 Experimental Comparison of Speed-Fuel-Flow and Speed-Area. Controls on a Turbojet Engine for Small Step Disturbances. L. M. Wenzel, C. E. Hart, and R. T. Craig. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3926, Mar. 1957, 56 p. (TL570 Un3t)

Over a limited range, speed was satisfactorily controlled by exhaust nozzle area.

8616 Experimental Investigation of Temperature Feedback Control Systems Applicable to Turbojet-Engine Control. C. E. Hart, L. M. Wenzel, and R. T. Craig. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3936, Mar. 1957, 56 p. (TL570 Un3t.)

Ability of the control system to control temperature during transient operation was evaluated by considering time integrals; of functions of temperature error as well as overshoot ratios and response times.

8617 A Comparison of Typical National Gas Turbine Establishment and NACA Axial-Flow Compressor Blade Sections in Cascade at Low Speed. A. Richard Felix and James C. Emery. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3937, Mar. 1957, 46 p. (TL570 Un3t)

8618 A Direct Measurement Technique of Determining Rocket Exhaust Velocities. Loren E. Bollinger and Rudolph Edse. *Wright Air Development Center, WADC Technical Report* 56-336, Nov. 1956, 42 p. (TL507 Un3.18w Vis.)

The front of a luminous wave is detected by a set of optical probes employing photomultiplier tubes. Signals from these probes are used to trigger an electronic 10-Mc., six-channel chronograph which will indicate in steps of 0.1μ sec. the time required for the wave to pass between any of the seven probes.

8619 Spark Ignition of Fuel Mists—Development of Apparatus and Preliminary Results. A. E. Weller. *Wright Air Development Center, WADC Technical Report* 55-430, Dec. 1956, 25 p. (TL507 Un3.18w Vis.)

Tests suggest improvements in equipment and show that ignition frequency in a liquid fuel mist increases with the spark electrode spacing.

See also: **7868** (stresses in turbine blades); **7992** (jet-engine test cell); **8007** (refractory turbine blades); **8728** (corrosion protection of heat exchangers); **8897** (detection of overheated turbine blades); **8991** (structure of S-816 turbine blades).

INFORMATION—PREPARATION AND DISSEMINATION

8620 On the Relation Between the Intelligibility and Frequency of Occurrence of English Words. Davis Howes. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 296-305.

The threshold of intelligibility for a word in a wide-spectrum noise is shown to be a decreasing function of the frequency with which the word occurs in general linguistic usage. The drop in threshold is about 4.5 db. per logarithmic unit of word frequency.

8621* **Presenting Information With 2 by 2 Slides.** Henry W. Smith. *Agronomy Journal*, v. 49, Mar. 1957, p. 109-113.

Slide vs. manuscript copies; mechanics of copy preparation; making and mounting the slides; suggestions for the speaker and the program chairman.

8622 Reading Improvement for Adults. Paul D. Leedy. 456 p. 1956. McGraw-Hill, New York. (LB1050 L51r)

Keys to rapid reading; use of words and punctuation; how to read reports and other types of written matter.

8623 Documentation in Instrumentation. William A. Wildhack, Joshua Stern, and Julian Smith. *U. S. National Bureau of Standards Report* 3276, Apr. 1954, 25 p. (Tl Un3.5r Contin.)

Analysis and application of a proposed documentation system covering various aspects of operation and design of instruments.

8624 Writing Useful Reports. Principles and Applications. Robert E. Tuttle and C. A. Brown. 635 p. 1956. Appleton-Century-Crofts, New York. (P7 T88w)

Principles; methods of presentation; use of illustrations; applications.

See also: **8325** (automatic language translation); **8593** (photocopying techniques).

INSTRUMENTATION

8625* (English.) **On the Determination of Roentgen Tube Focal Spot Sizes by Pin-Hole Camera Roentgenography.** A. H. G. Kuntke. *Acta Radiologica*, v. 47, Jan. 1957, p. 55-64.

8626 The Lives of Electron Microscope Filaments. R. N. Bloomer. *British Journal of Applied Physics*, v. 8, Feb. 1957, p. 83-85.

Thermal-evaporation-limit lives in microscopes used at high magnifications. The life limited by evaporation decreases as the temperature and thermionic emission increase.

8627 Vacuum Installation for the Study of Reduction and Oxidation Kinetics. D. M. Chizhikov and G. G. Gvelesiani. *Henry Brutcher Translation No.* 3841, 4 p. (From *Zavodskaya Laboratoriya*, v. 22, no. 4, 1956, p. 499-501.) Henry Brutcher, Altadena, Calif.

Process is based on continuous measurement of weight of substance being oxidized or reduced.

8628 A "Free Space" Absorption Cell for Microwave Spectroscopy. C. C. Costain. *Canadian Journal of Physics*, v. 35, Mar. 1957, p. 241-247.

Cell consists of a pyrex tube with a polystyrene lens and microwave horn at each end to couple to the standard microwave components. Attenuation at 8.5 mm. wavelength is 3.4 db. for a 250 cm. cell.

8629 Accelerometers—Which Type for the Job? Anthony Orlacchio and George Hieber. *Electronic Industries & Tele-Tech*, v. 16, Mar. 1957, p. 75 + 5 pages.

Major types are compared with reference to acceleration range, frequency response, accuracy, and temperature environment.

8630* (Czech.) Measuring Instruments for Resistance Thermometers. **Měřicí přístroje pro odporové teploměry.** Jaroslav Edl. *Elektrotechnický Obzor*, v. 45, Nov. 1956, p. 554-560.

The functional principal of cross-coil measuring systems, unbalanced and automatically balanced bridges, with a brief survey of their theory in respect to temperature measurement.

8631* (Czech.) Vacuum Measurements. **Měření vakua.** Aleš Bláha. *Elektrotechnický Obzor*, v. 45, Dec. 1956, p. 609-616.

Survey of methods for temperature measurement at low densities and for low-pressure measurements.

8632* (French.) *p*H Measurement and Control. **Mesure et régulation du *p*H.** G. Vivin. *Genie Chimique (Supplement to Chimie & Industrie)*, v. 77, Feb. 1957, p. 37-47.

Equipment and methods for continuous control of *p*H.

8633* (Finnish.) X-Ray Photography. **Röntgenkuvauksesta.** J. E. Holmström. *Hitsaustekniikka Svetsteknik*, no. 1, Jan. 1957, p. 20-23.

A study of the factors influencing the lack of sharpness and of the degrees of exposure for different cases.

8634 Equipment to Measure the Energy Absorption of Films at High Strain Rates. R. D. Spangler and E. B. Cooper. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 329-333.

Measured quantity is the amount of energy absorbed by a film when a ball is projected through it. Velocity of the ball can be varied from about 20 ft. per sec. to 800 ft. per sec. A conditioning chamber permits testing over a temperature range of −40 to +80 C.

8635 Two-Parameter Gloss Methods. I. Nimeroff. *Journal of Research, National Bureau of Standards*, v. 58, Mar. 1957, p. 127-135.

A two-parameter technique employing specular reflection measurement with a large and a small receptor aperture will reveal the existence of more than one gloss type.

8636 A Precision Paramagnetic Resonance Spectrometer. K. D. Bowers, R. A. Kamper, and R. B. D. Knight. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 49-53.

An instrument for the accurate comparison in the same magnetic field of the frequency of electronic magnetic resonance absorption, particularly in gaseous materials, with the frequency of proton resonance absorption.

8637 A Small Vacuum Induction Furnace. J. C. Matthews. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 62-63.

Melts up to 300 g. may be made under high vacuum. Material may be added to the crucible from a hopper and the melt cast into a split Cu mold while under high vacuum.

8638 An Improved Inductance Method for Measuring Susceptibilities of Small Paramagnetic Specimens at Low Temperatures. F. R. McKim and W. P. Wolf. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 64-67.

Measurements are made in terms of the change of mutual inductance produced by moving a specimen inside a coil system, using a Hartshorn bridge operating at 175 c.p.s. to measure the inductance.

8639 The Calibration and Use of an Air-Driven Ultracentrifuge. P. Johnson. *Journal of Scientific Instruments*, v. 34, Mar. 1957, p. 91-97.

Stresses experimental aspects which affect the accuracy of derived sedimentation constants in Phywe type ultracentrifuges.

8640* (French.) Comparing Some Replica Techniques. Description of a New Method That Can be Applied to Brittle Metals. **Comparaison de quelques techniques de répliques. Description d'une méthode nouvelle applicable aux métaux fragiles à froid.** W. Pitsch, G. Henry, and J. Plateau. *Métaux, Corrosion-Industries*, v. 32, Feb. 1957, p. 47-54.

Alumina and carbon replicas are more resistant, stand a higher electron flow, and give a better contrast. Method for preparing carbon replicas of electrolytically polished surfaces of brittle and fragile materials.

8641 Analysis of Large Aperture Parabolic Mirrors for Solar Furnaces. Joseph Farber and Burton I. Davis. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 216-220.

The maximum attainable temperature is calculated as 5200 K.

8642 Uncompensated Corner-Reflector Interferometer. Edson R. Peck. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 250-252.

A noncompensated instrument has disadvantages when compared to a compensated one, and when properly adjusted it may still be usable with a photoelectric detector. The flux is integrated over rectangular field stops.

8643 New Compasses. A. Hine. *Research*, v. 10, Mar. 1957, p. 97-107.

The development of transmitting magnetic systems is traced to the gyro-magnetic compass in which are incorporated the best features of both the gyroscopic and magnetic compasses.

8644* The Measurement of the Pressure in the Determination of Pump Speed. A. Venema. *Vacuum*, v. 4, July 1954, p. 272-283.

Proposed a new method based on well-known concepts in the physics of gas flow at very low pressures.

See also: **7983** (carbon replica techniques); **8063** (analytical instruments); **8081** (chemical laboratory equipment); **8623** (instrumentation documentation); **8879** (stability of length standards); **8995** (capacitor dilatometer); **9326** (moisture tester).

LUBRICATION AND FRICTION

8645 Bearing Design and Application. Donald F. Wilcock and E. Richard Booser. 464 p. 1957. McGraw-Hill, New York. (TJ1061 W64b)

Provides practical guidance to the machine designer in selection and use of bearings and their lubrication. Design criteria, charts, and formulas are presented.

8646* (French.) A Study of Temperature in a Limited Thermal Medium Applied to Friction Problems in Braking. **Étude de la température en milieu thermique limité dans les problèmes de frottement appliqués au freinage.** Jean Odier and Pierre Leutard. *Comptes Rendus*, v. 244, Feb. 25, 1957, p. 1141-1142.

A theoretical study of a formula expressing the increase of the average temperature of a rubbing surface during braking with constant slowing.

8647* (Russian.) Fatigue of Metals Under Contact Friction. **Ustalost' metallov pri kontaktnom trenii.** V. S. Ivanova, and I. A. Oding. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 95-102.

Decrease in fatigue limit of Cr-Ni-Mo steel during contact friction is explained as due to electroerosion from thermoelectric currents produced by changes in contact resistance. This erosion leaves vacancies in the crystal lattice. Fatigue limit can be raised by changing the direction of the thermoelectric current through proper choice of materials or by inducing a counter-current.

8648* Additives With a Purpose. *Lubrication*, v. 43, Mar. 1957, p. 25-40.

A review of the commonly used lubricant additives, their purpose, and mechanism of action.

8649* Surface Viscosity & Elasticity of Lubricating Oils. D. W. Criddle. *Lubrication Engineering*, v. 13, Mar. 1957, p. 131-135.

Certain additives in oil at 1% to 5% concentration impart viscosity and elasticity to oil-air and oil-water interfaces. The viscosity and elasticity depend upon the nature and concentration of surfactant, oil, age of interface, and amplitude of oscillation.

8650* Radiation-Resistant Greases. J. G. Carroll, R. O. Bolt, and B. W. Hotten. *Lubrication Engineering*, v. 13, Mar. 1957, p. 136-140.

Radiation altered consistency. Most greases softened initially but eventually became solid. Bearing life was reduced by 40 to 90% and oxidation resistance was also severely impaired. Greases made from alkylaromatic fluids and selected gelling agents gave excellent results in standard tests and showed superior radiation resistance after $32 \times 10^8 r$.

8651* Graphite and Molybdenum Disulphide. E. R. Braithwaite. *Nuclear Engineering*, v. 2, Mar. 1957, p. 107-110.

Factors affecting their lubricating properties in reactors.

8652 Oil Cooling and Oil Coolers. I. G. A. Montgomerie. *Scientific Lubrication*, v. 9, Mar. 1957, p. 10 + 7 pages.

Heat transfer theory; mean temperature difference; analysis of over-all and partial heat transfer coefficients. (To be continued.)

8653 Preliminary Metallographic Studies of Ball Fatigue Under Rolling-Contact Conditions. H. Robert Bear and Robert H. Butler. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3925, Mar. 1957, 38 p. (TL570 Un3t)

Origin and progression of fatigue failures were observed at room temperature and 200 to 250 F.

8654* (German.) Colloidal Graphite and Its Effect on Friction and Lubrication in Internal Combustion Motors. **Kolloidaler Graphit und sein Einfluss auf Reibung und Schmierung, besonders in Verbrennungsmotoren.** J. U. Augustin and Anna Maria D'Ans. *VDI Zeitschrift*, v. 99, Mar. 1957, p. 274-279.

Friction and wear; lubrication; adhesive and cohesive forces. (To be continued.)

8655* (Russian.) Reducing the Tendency of Lubricated Stainless Steel to Sieze Under Friction. **Povyshenie stoikosti nerzhaveiiushchei stali protiv zadiraniia pri trenii so smazkoi.** B. Kh. Somin and S. L. Matskevich. *Vestnik Mashinostroeniia*, v. 37, Mar. 1957, p. 28-34.

Causes of seizing: effects of alloying elements; suggested surface treatments.

8656 Development of Friction-Seal Materials for High Temperature-High Speed Operation. Peter F. Mataich. *Wright Air Development Center Materials Laboratory, WADC Technical Report* 56-579, Feb. 1957, 18 p. (TL507 Un3.18w Vis.)

The 30 Ni- and Co-base alloys evaluated showed excessive wear which was attributed to the excessive temperatures reached at the mating surfaces when the lubricating oil film broke down. This condition could be remedied by incorporating a suitable solid lubricant in the seal material itself.

See also: **8883** (fatigue properties of bearing metals); **8992** (structure of friction surface of steel).

MECHANICAL ENGINEERING

8657 The Design of Intermediate Vertical Stiffeners on Web Plates Subjected to Shear. K. C. Rockey. *Aluminium Development Association*, Nov. 1956, 22 p. (TS550 A182r Vis.)

New empirical relationships between the flexural rigidity and spacing of the intermediate stiffeners and the buckling stress of the stiffened web plate were established.

8658 The Design of the Webplates of Light Alloy Plate Girders. K. C. Rockey. *Aluminium Development Association, Research Report No.* 32, June 1956, 15 p. (TS550 AL82r Vis.)

Extensive tests involving pure shear, pure bending, and combinations of shear and bending resulted in design formulas recommending that the webplates should, in certain instances, be designed to operate in the postbuckled range.

8659* Shear Strength of Reinforced Concrete Frame Members Without Web Reinforcement. JoDean Morrow and I. M. Viest. *American Concrete Institute, Journal*, v. 28, Mar. 1957, p. 833-869; *ACI Proceedings*, v. 53, 1957, p. 833-869.

Tests on 71 specimens show that strength is affected by shear through the formation of diagonal tension cracks. The diagonal tension cracking load is expressed in terms of the nominal shearing stress, and the shear compression strength is expressed in terms of the shear moment capacity.

8660 A Progress Report on Development of an Atomic-Powered Locomotive. B. C. Gunnell. *American Society of Mechanical Engineers, Paper No.* 56-A-79, 1956, 6 p. (TJ1 Am35p Contin.)

At present it is questionable whether an atomic-powered locomotive can justify its existence on American commercial railroads, but it does appear that such a locomotive has a place in our military service.

8661 The Fundamental Modes of Vibration of Uniform Beams for Medium Wavelengths. G. J. Kynch. *British Journal of Applied Physics*, v. 8, Feb. 1957, p. 64-73.

The Rayleigh-Ritz method is used to determine approximate forms for the dispersion curves and to investigate relations between the different types of vibrations.

8662 Select Best Pump Seal. H. E. Tracy. *Chemical Engineering*, v. 64, Apr. 1957, p. 239-254.

Sealing methods in relation to pressures, temperatures, and liquids commonly met today.

8663 Mechanical Infinitely Variable Speed Drives. P. Cahn-Speyer. *Engineers' Digest*, v. 18, Feb. 1957, p. 41-65.

Details of a number of belt, friction, and impulse drives.

8664 Some Studies on the Behavior of Prestressed Concrete Columns. A. M. Ozell and A. M. Jernigan. *Florida Engineering and Industrial Experiment Station, Technical Progress Report*, v. 10, Suppl. no. 3, July 1956, 12 p. (TAl F66e Contin.)

It is believed that prestressed columns would have superior strength compared to reinforced concrete columns at L/d values of 20 and 30.

8665* Some Observations on Local Vibration. A. J. Johnson and P. W. Ayling. *Institution of Engineers & Shipbuilders in Scotland, Transactions*, v. 100, pt. 3, 1956-1957, p. 141-200.

Types of ship vibration and related problems. Typical examples. Some generalizations regarding the diagnosis and cure of local vibration, and the special problems which may be associated with high-powered vessels.

8666 Lower Buckling Stress of Circular Cylindrical Shells Subjected to Torsion. Yoshimaru Yoshimura and Jun'etsu Niisawa. *Journal of the Aeronautical Sciences*, v. 24, Mar. 1957, p. 211-216.

Torsional buckling was treated as a Durchschlag phenomenon by means of the energy method based on the finite deformation theory. Results satisfactory for explaining the discrepancy between theoretical and experimental results were obtained.

8667 Plastic Torsional Buckling Strength of Cylinders Including the Effects of Imperfections. Lawrence H. N. Lee and Clifford S. Ades. *Journal of the Aeronautical Sciences*, v. 24, Apr. 1957, p. 241 + 8 pages.

8668 Postbuckling Behavior of Circular Cylindrical Shells Under Hydrostatic Pressure. Joseph Kempner, K. A. V. Pandalai, Sharad A. Patel, and Jacques Crouzet-Pascal. *Journal of the Aeronautical Sciences*, v. 24, Apr. 1957, p. 253-264.

Stable postbuckling equilibrium configurations exist for loads greater than, as well as loads slightly less than, the critical load calculated from small-deflection theory.

8669 Plastic Buckling of Simply Supported Plates Subjected to Combined Shear and Bending or Eccentric Compression in Their Plane. P. P. Bijlaard. *Journal of the Aeronautical Sciences*, v. 24, Apr. 1957, p. 291-303.

8670 The Synthesis of Four-Bar Mechanisms by the Method of Components. J. Hirschhorn. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 22-24.

The vectors are resolved into Cartesian components. This permits the synthesis for prescribed conditions concerning angular velocities, accelerations, and lengths of links.

8671 Structural Damping of a Simple Built-Up Beam With Riveted Joints in Bending. T. H. H. Pian. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 35-38.

An analytical expression of the energy loss per cycle of static loading is derived in terms of amplitude of load, stiffness of rivets, and tightness of joint.

8672 Some New Data on High-Speed Impact Phenomena. J. H. Huth, J. S. Thompson, and M. E. Van Valkenburg. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 65-68.

Summary of recent experimental work aimed at evaluating the role of various physical parameters in high-speed impact phenomena. Includes data for steel, Al, brass, Pb, Mg, and a Mg-Li alloy.

8673 Min-Max Solutions for the Linear Mass-Spring System. Eugene Sevin. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 131-136.

Absolute upper and lower bounds were determined for the maximum displacement of an undamped linear mass-spring system acted on by a non-negative forcing function characterized only by total impulse and duration.

8674* The Propagation of Infinitesimal Plane Waves in Elastic-Plastic Materials. J. W. Craggs. *Journal of the Mechanics and Physics of Solids*, v. 5, Mar. 1957, p. 115-124.

Plane waves of two types may exist, each involving both dilatation and shear strain, and an equation for the velocities of such waves is given. Possible interactions between plastic (loading) waves and elastic (unloading) waves are discussed and the treatment of such interactions is illustrated by examples. A velocity equation is given.

8675* (English.) **Analysis on Creep of Statically Indeterminate Reinforced Concrete Structures.** Kiyoshi Okada. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 18, Oct. 1956, p. 329-340.

The effect of differences in creep characteristics of members on stress distribution is analyzed theoretically. Variation in redundant forces is considerably large, especially in structures composed of reinforced concrete and steel members.

8676 Speed Reducers and Gearmotors. William S. Miller. *Machine Design*, v. 29, Mar. 21, 1957, p. 121-149.

A comprehensive design guide to selection and application of fixed-ratio gear units available in standard "packaged" forms.

8677 Hydraulic Servos. III. Practical Methods for Analyzing Typical Systems. J. M. Nightingale. *Machine Design*, v. 29, Mar. 21, 1957, p. 160-164.

The system considered includes an electronic amplifier, a magnetic relay, a hydraulic pilot valve, and a valve-cylinder relay.

8678* Problems of Structural Design for Elevated Temperatures. Alfred M. Freudenthal. *New York Academy of Sciences, Transactions*, v. 19, Feb. 1957, p. 328-342.

Design significance of operational life and of inelastic behavior; temperature stresses; ideal plastic medium; interaction between effects of load and temperature; selection of structural materials.

8679 Non-Linear Deflections of Shallow Spherical Shells. Edward L. Reiss, Herbert J. Greenberg, and Herbert B. Keller. *New York University, Institute of Mathematical Sciences (U. S. Atomic Energy Commission)*, NYO-7695, Dec. 1956, 58 p. (UF767 U3ny Contin.)

Numerical solutions of the non-linear equations governing the deflections of clamped shallow, spherical shells under a uniform external pressure were obtained by power series techniques.

8680 Analysis and Design of the Frozen Seal. J. F. Bailey. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2110, Mar. 1957, 9 p. (UF767 U3o Contin.)

Derivation of an equation for relating the power required to drive an infinitely-long seal, the viscosity of the liquid being sealed, the shaft speed, and the dimensions of the seal. Design procedure.

8681 How to Choose and Use Today's Gaskets in Today's Equipment. Ron Cannon. *Petroleum Processing*, v. 12, Mar. 1957, p. 95-110.

Gasket construction, functions, materials, and designs.

8682* The Launching and Propagation of Elastic Waves in Plates. H. Pursey. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Feb. 1957, p. 45-62.

Relation of amplitude of the disturbance to a given stress distribution on the free surfaces of the plate, varying harmonically with time. Derivation of formulas from which the amplitude and group velocity of a given wave may be calculated.

8683* Vibrations of Beams. I. Longitudinal Modes. G. J. Kynch and W. A. Green. **II. Torsional Modes.** W. A. Green. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Feb. 1957, p. 63-78.

Second order perturbation theory is applied to both types of vibration.

8684 The Diffusion of Load From a Stiffener Into an Infinite Elastic Sheet. E. H. Brown. *Royal Society, Proceedings*, v. 239, ser. A, Mar. 12, 1957, p. 296-310.

Exact solutions are given to three fundamental problems of the diffusion of load in an infinite two-dimensional elastic sheet to which a semi-infinite elastic stiffener is continuously attached throughout its length.

8685 Some Observations on Stresses in Large-Diameter Pipelines. G. M. McClure. 13 p. 1957. Battelle Memorial Institute, Columbus. (TJ930 M13s Over.)

Some predominant sources of secondary stresses, magnitude and significance of these stresses, and how they may be eliminated or taken into account in the design and operation of a line.

8686 Elements of Design for Prevention of Hot Tearing in Steel Castings. I. An Atlas of Hot Tears in Steel Castings. Richard A. Flinn, Paul K. Trojan, and George Hilsabeck. **II. Joining of Simple Sections.** Isaac Minkoff and Howard F. Taylor. *Steel Founders' Society of America, Research Report No.* 38, Feb. 1957, 52 p. (TN621 S32r Vis.)

Objective was to ascertain the form, shape appearance, and distribution of hot tears in castings. Design rules were formulated for joining sections so as to prevent hot tear formation.

8687 Studies in Elastic Structures. A. J. S. Pippard. 361 p. 1952. Edward Arnold & Co., London. (TG260 P66s)

Analysis of stresses in rings, wheels, girders, pipes, ribs, and other structures.

8688* (French.) Selecting Operating Parameters in Transport Planes. **Choix des paramètres d'utilisation des avions de transport.** A. Gatineau. *Technique et Science Aéronautiques*, v. 6, no. 6, 1956, p. 281-290.

An economic study of the use of transport planes, especially of the payload as a preponderant factor which should be complete at 70%, while the passenger should be considered as a varying factor.

8689 Directional Properties of Glass-Fiber-Base Plastic Laminate Panels of Sizes That Do Not Buckle. Fred Werren and C. B. Norris. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1803, Mar. 1956, 54 p. (TS800 Un3.3r Contin.)

Elastic and strength properties. Effect of grain direction upon the bearing, edgewise-shear, and interlaminar-shear properties.

8690* (English.) **Stress Distribution in a Thin Aeolotropic Strip Due to a Nucleus of Strain.** Pritindu Choudhury. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 36, Nov.-Dec. 1956, p. 413-416.

The stresses due to a nucleus in the form of a center of dilatation situated midway between the straight edges of a thin aeolotropic strip were found by applying a Fourier transform.

8691* (English.) **Some Simple Problems of Flexure. I.** R. Mohan. *Zeitschrift für Angewandte Mathematik und Mechanik*, v. 36, Nov.-Dec. 1956, p. 427-432.

Solution of a uniform beam having a horse-shoe shaped section bounded by two confocal ellipses and a portion of their minor axis, and a uniform beam having a section bounded by a parabola and a straight line.

8692* (English.) **Circular Cylinder Under Periodic Fluctuations of Temperature.** Václav Vodička. *Zeitschrift für Angewandte Mathematik und Physik*, v. 8, Jan. 25, 1957, p. 53-64.

Behavior of heat waves and homogeneous isotropic cylindrical bodies in periodic temperature fields.

See also: **8646** (friction problems in braking); **8656** (high-temperature seals); **8898** (design of pressure vessels); **9123** (motor vehicle design); **9300** (hot-water piping).

METALLURGY

8693* (Portuguese.) Preliminary Considerations on the Problem of Steel Rolling in Latin America. **Considerações preliminares sôbre o problema da laminação do aço na américa latina.** E. de Macedo Soares e Silva. *ABM (Boletim da Associação Brasileira de Metais)*, v. 12, Oct. 1956, p. 317-330.

Because of the condition of the internal market, the large variety of products, and the personnel used, special solutions are required for steel slabbing and rolling problems in Latin America.

8694 (English.) **Special Steels for the Manufacture of Boiler Tubes.** *Aciers Fins & Spéciaux Français*, no. 24, Dec. 1956, p. 55-61.

Physical properties and alloy compositions are discussed.

8695* **Liquid Metals and Nuclear Power. II.** C. D. Boadle. *Atomics & Nuclear Energy*, v. 8, Mar. 1957, p. 83 + 3 pages.

General handling problems; pumping; liquid-metal-cooled reactors now in existence; liquid-fuel reactors.

8696* (Russian.) Some Properties of Zirconium-Niobium Alloys. **Nekotorye svoistva splavov tsirkoniia s niobiem.** Iu. F. Bychkov, A. N. Rozanov, and D. M. Skorov. *Atomnaia Energiia*, v. 2, Feb. 1957, p. 146-151.

Preparation of alloys; constitution diagram; expansion at room temperature; heat resistance and hardness up to 750 C; aging properties.

8697* (German.) Light Metal Metallurgy. **Die Metallurgie der Leichtmetalle.** *Berg- und Hüttenmännische Monatshefte der Montanistischem Hochschule in Leoben*, v. 101, Dec. 1956, p. 258-285.

Five articles on development in the metallurgy of Al, Mg, and Ti.

8698* (German.) The State of the Titanium Industry. **Der Stand der Entwicklung des Titans.** M. Hansen. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 101, Dec. 1956, p. 285-307.

Four articles on Ti alloys and the contemporary state of the Ti industry. Includes phase diagrams of systems based on Ti.

8699* (German.) Technology of Light Metals. **Die Technologie der Leichtmetalle.** *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 101, Dec. 1956, p. 308-359.

Development of a light metal foundry; gating practice. Remelted Al alloys. Light metal rolling. Production of large cross-section castings. New Al welding processes. Problems in light metal surface treatment in Italy. Experiences in continuous casting and rolling of Al strip. Earing in Al and Al alloys during deep-drawing.

8700* (German.) Problems in Metallurgy, Metallography and Physics of Light Metals. **Probleme aus der Metallurgie, Metallographie und Physik der Leichtmetalle.** *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 101, Dec. 1956, p. 360-389.

Over-heating of light metals during melting. Light metal powder metallurgy. Static and dynamic strength properties of high-strength Al alloys. Metallographic problems in manufacture of items by the extrusion process. Applications of light metals on the basis of their physical properties.

8701* (German.) Applications of Light Metals. **Anwendung der Leichtmetalle.** *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 101, Dec. 1956, p. 390-438.

Semi-finished light metals in Austria. Calculation and utilization in light-weight construction. A new light alloy for structures. Applications of Al in transportation. Aluminum in electrotechnics. Engineering problems in the development of new Al products and their use.

8702 Scope for Physical Chemistry in Metallurgy. G. Heynert. *Henry Brutcher Translation No.* 3808, 15 p. (Abridged from *Stahl und Eisen*, v. 76, no. 16, 1956, p. 1049-1052.) Henry Brutcher, Altadena, Calif.

Critical review of French reports concerning fundamental research on theoretical aspects of ferrous metallurgy.

8703 Recent Advances in Metallic Materials of Construction for Use in the Chemical Industry. N. P. Inglis. *Chemistry & Industry*, no. 7, Feb. 16, 1957, p. 180-189.

Characteristics, uses, and methods of shaping and forming corrosion-resistant steels and Cu, Al, Ti, and their alloys.

8704 Technical Survey. *Copper Development Association, Technical Survey No.* 9, Jan. 1957, 43 p. (TN780 C79t Contin.)

A survey of technical progress in production, fabrication, joining, and finishing of Cu and Cu alloys during the second half of 1956.

8705 Curtain Walls of Stainless Steel. John Hancock Callender, Henry A. Jandl, Robert W. McLaughlin, and James C. Ritchie. 188 p. 1955. American Iron and Steel Institute, New York. (TH2247 P93c Over.)

Report includes pertinent data and illustrations of outstanding buildings employing curtain walls, and detailed discussions of various design considerations.

8706 (Czech.) Replacing Lead Cable Sheathing With Aluminum. **Náhrada olověných plášfů kabelů hlinikem.** Zdeněk Janků and Kablo Děčín. *Elektrotechnik*, v. 11, Nov. 1956, p. 348-351.

Technical and economic aspects of using Al as a substitute; manufacturing techniques.

8707* (German.) New Methods in Thermodynamics and in the Calorimetry of Alloys; Their Application to Iron and Steel. **Neue Wege der Thermodynamik und der Kalorimetrie der Legierungen, ihre Anwendung auf Eisen und Stahl.** W. Oelsen and E. Schürmann. *Giesserei*, v. 44, Feb. 28, 1957, p. 113-120.

Significance of calorimetry for the metallurgist and foundryman. Conclusions drawn from heat content curves of Pb-Cd and Fe-C alloys.

8708* (Czech.) Radioactive Isotopes in Non-Ferrous Metallurgy. **Radioisotopy v kovohutnictví.** Adolf Valášek. *Hutník*, v. 7, Feb. 1957, p. 53-56.

Principles of radioactive isotopes with special emphasis on those used at present in non-ferrous metallurgy; practical applications in testing and research.

8709* (Japanese.) **Effect of Mo and V Additions on Si-Cr-W Steels for Shock-Resisting Tools.** Sadao Koshiba and Tsuneo Kunō. *Iron & Steel Institute of Japan, Journal*, v. 43, Feb. 1957, p. 142-145.

Effects on steel containing 0.55% C, 1.4% Cr, and 2.1% W. The transformation point, quenching and tempering hardness, hardenability, rate of deformation, mechanical properties at elevated temperature, and microstructures are reviewed.

8710* (Hungarian.) Vacuum Technology in Metallurgy. **Vákuumtechnika a kohászatban.** Andor Szulyovszky. *Kohászati Lapok*, v. 11, Oct. 1956, p. 456-464.

Summarizes technology of resistance furnaces, induction furnaces, low-pressure electric-arc furnaces, heating and degassing, shrinkage, melting, distillation and sublimation, and the vacuum reduction of metals.

8711* (Russian.) Properties of Cast Alloy Structural Steel. **Svoistva litoi legirovannoi konstruktsionnoi stali.** B. B. Guliaev, I. A. Shapranov, V. M. Shleizman, and P. E. Kovalenko. *Liteinoe Proizvodstvo*, no. 2, Feb. 1957, p. 11-16.

Comparison of mechanical and technological properties of alloy steels containing C, Mn, Si, Cr, Ni, Mo, Cu, and W.

8712 Titanium Research and Development. N. P. Inglis. *Metal Industry*, v. 90, Mar. 8, 1957, p. 185 + 4 pages.

Deals with melting, alloying, and processing into various wrought forms; alloying behavior, development of new alloys, and properties of the metal and its alloys in various forms. (To be continued.)

8713* (German.) Effects of Antimony on Aluminum Alloys. **Einflüsse von Antimonzusätzen auf Aluminiumlegierungen.** W. Thury. *Metall*, v. 11, Mar. 1957, p. 190-192.

Effects on structure and other properties.

8714 Copper and Copper Alloys. A Survey of Technical Progress During 1956. E. Voce. *Metallurgia*, v. 55, Mar. 1957, p. 109-120.

Progress made in the past yr. in the metallurgy of Cu and its alloys.

8715 (Italian.) Metallurgical Problems of Nuclear Reactors. **I problemi metallurgici dei reattori nucleari.** F. Giordani. *Metallurgia Italiana*, v. 49, Jan. 1957, p. 1-13.

A survey of problems related to fusion and fission, sources of nuclear fuels, isotopic splitting of U, chemical separation of Pu-239 and U-233, and various types of reactors.

8716 Effects of Neutron Irradiation on Metals and Alloys. A. H. Cottrell. *Metallurgical Reviews*, v. 1, pt. 4, 1956, p. 479-522.

Theory of atomic collisions from which damage originates; behavior of metals and alloys under irradiation in a nuclear reactor; effect on mechanical properties; transmutation effects.

8717* (French.) The Present State of Nickel Production Techniques. **L'état actuel des techniques de production du nickel.** L. F. Denaro. *Métallurgie et la Construction Mécanique*, v. 89, Jan. 1957, p. 25 + 4 pages.

History and early days of Ni production; various categories of ores; refining processes for sulfide and oxide ores.

8718* (French.) Cementation Steels. **Les aciers de cémentation.** J. Marcovici and P. Tordjman. *Métallurgie et la Construction Mécanique*, v. 89, Jan. 1957, p. 43 + 3 pages.

Their analysis, mechanical properties, and processing. (To be continued.)

8719* (German.) Flaking in Steel. **Flocken im Stahl.** F. Feeg. *Radex Rundschau*, no. 1, Feb. 1957, p. 470-475.

Measures to reduce the danger of flaking aim toward reducing H content in the liquid steel on the one hand, and to favor diffusion of H in the ingot or forging piece on the other.

8720 16-15-6 Alloy Fills a Need. Martin Fleischmann. *Steel*, v. 140, Mar. 25, 1957, p. 102-105.

This superalloy can be produced in large quantities with uniform quality by standard melting practices. It has low strategic alloy content and is easy to fabricate.

8721 Metallurgy Information Meeting, Ames Laboratory, Iowa State College, May 2, 3, and 4, 1956. *U. S. Atomic Energy Commission*, TID-7526, pt. 1, Feb. 1957, 281 p. (UF767 Un3ti Contin.)

A collection of 18 papers related to reactor metallurgy, including nondestructive techniques, Zr alloy uses, and NaK problems.

8722 Consumable-Electrode Arc Melting of Titanium and Its Alloys. R. W. Huber and I. R. Lane, Jr. *U. S. Bureau of Mines, Report of Investigations*, 5311, Feb. 1957, 36 p. (TN21 Un3r)

Melting equipment; ingot properties; structure and homogeneity; fabrication procedures.

8723* (Polish.) Experiments in Improving the Quality and Increasing the Output of O8X Steel. **Próby polepszenia jakości i zwiększenia uzysku stali O8X.** J. Górecki, J. Janicki, and B. Kurdziel. *Wiadomości Hutnicze*, v. 13, Jan. 1957, p. 3-7.

Studies on a rimmed structural steel. Discussion of defects and means of eliminating them.

8724* (Polish.) Some Problems in Improving the Quality of Sheet Steel and More Effectively Utilizing the Capacity of Rolling Mills. **Niektóre zagadnienia poprawy jakości blach i wzrostu wykorzystania zdolności produkcyjnej walcowni blach.** Antoni Chojkowski. *Wiadomości Hutnicze*, v. 13, Jan. 1957, p. 7-11.

Study of blast furnace burden and heating rate; rolling variables. Suggestions for remodeling the rolls for greater output by using a cast iron sleeve on a steel core.

See also: **8637** (laboratory induction furnace); **9353** (specifications for welding steel).

METALS—CORROSION

8725* (German.) Investigations of the Reaction Between Aluminum and Water. **Untersuchungen über die Reaktion zwischen Aluminium und Wasser.** D. Altenpohl. *Aluminium*, v. 33, Feb. 1957, p. 78-91.

Layers of bohmite formed on the surface of Al exposed to boiling water have proved valuable for repressing the blackening of Al by tap water, also as a basis for paints and for general corrosion protection.

8726* (German.) Corrosion Resistance of High-Purity Aluminum. **Uber das Korrosionsverhalten von Reinst-aluminium.** E. Nachtigall. *Aluminium*, v. 33, Feb. 1957, p. 95-100.

Resistance in distilled water at temperatures over 100 C and at high pressure (conditions obtained in nuclear reactors) is a good deal lower than shown from numerous autoclave tests.

8727 Studies Relating to the Reaction Between Zirconium and Water at High Temperatures. Alexis W. Lemmon, Jr. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-1154, Jan. 1957. Sections individually paged. (UF767 U3b Contin.)

Emissivity measurements on Zircaloy; diffusion of oxygen in α- and β-Zircaloy two and Zircaloy three at high temperatures; measurement of steam Zircaloy two reaction rates; cooling mechanism of Zircaloy two droplets in water.

8728* The Protection of Heat Exchangers Against Corrosion. L. C. Ferris. *British Chemical Engineering*, v. 2, Mar. 1957, p. 122-127.

Types of attack; choice of paint; cathodic protection; anode performance; electrolyte resistivity; uses of graphite.

8729 (French.) Electrochemical Behavior of Aluminum. Potential-pH Equilibrium Diagram of the System Al-H_2O, at 25 C. **Comportement électrochimique de l'aluminium. Diagramme d'equilibre tension-pH du système Al-H_2O, à 25°C.** E. Deltombe and M. Pourbaix. *Centre Belge d'Etude de la Corrosion, Rapport Technique, No.* 42, Dec. 1956, 20 p. (TA462 C33r Contin.)

On the basis of free enthalpies of standard formation of various constituents of the Al-H_2O system, an equilibrium diagram according to the pH and the electrode voltage at 25 C was made. Corrosion, passivation, and stability of Al were studied.

8730 (French.) The Conditions of Passivation of Iron by Chromates, Molybdates, Tungstates and Vanadates. **Sur les conditions de passivation du fer par les chromates, molybdates, tungstates et vanadates.** M. Pourbaix and N. de Zoubov. *Centre Belge d'Etude de la Corrosion, Rapport Technique No.* 43, Jan. 1957, 6 p. (TA462 C33r Contin.)

With the aid of electrochemical equilibrium diagrams and a new hypotheses, the conditions of pH and of electrode voltage were defined for which 0.01 molar solutions of chromate, molybdate, tungstate or vanadate can theoretically have an activating or passivating action on iron.

8731 Cathodic Protection of the Coated Steel Gas Main Distribution System in New Orleans. Sidney E. Trouard. *Corrosion*, v. 13, Mar. 1957, p. 151t-161t.

8732 Corrosion Control System for Underground Cables in Conduit in a Stray Current Metropolitan Area. Edward P. Teale. *Corrosion*, v. 13, Mar. 1957, p. 165t-172t.

A controlled type of rectifier employing two stages of magnetic amplification was used.

8733 The Corrosion of Steel in a Reinforced Concrete Bridge. R. F. Stratfull. *Corrosion*, v. 13, Mar. 1957, p. 173t-178t.

In salt water environments, corrosion problems can be minimized by using a concrete formulation having minimum porosity and by a design having a maximum coverage of concrete over the reinforcing steel.

8734 The Evaluation of Cooling Tower Corrosion Inhibitors. W. L. Denman and Charles B. Friedman. *Corrosion*, v. 13, Mar. 1957, p. 179t-185t.

Inorganic corrosion inhibitors such as chromates, polyphosphates, and combinations of the two, when used in an experimental tower, provided corrosion protection comparable to that found in the field with those inhibitors.

8735* (French.) Topochemical Studies of Corrosion Phenomena. **L'étude topochimique des phénomènes de corrosion.** W. Feitknecht. *Corrosion et Anticorrosion*, v. 5, Feb. 1957, p. 36-50.

Properties and structure of solid corrosion products determined by means of the electron microscope and X-ray diffraction. Studies of oxide and other types of corroded layers on Cu and Zn.

8736* (French.) Changes in Sea-Water Characteristics in a Corrosion Testing Station. **Étude de l'évolution des caractéristiques de l'eau de mer dans une installation d'essais de corrosion.** L. Barriety, J. Debyser, and A. Hache. *Corrosion et Anticorrosion*, v. 5, Feb. 1957, p. 51-57.

Effect of photosynthesis on corrosion of steel by sea-water. Effect of sunlight on temperature, pH, dissolved O content, and other properties of the water. During summer the O content of the sea-water running through the testing vats is twice as great as during other months when sunlight is not so intense.

8737 Mechanisms of Aqueous Corrosion of Aluminum at 100°C. K. M. Carlsen. *Electrochemical Society, Journal,* v. 104, Mar. 1957, p. 147-154.

Alkalinity produced at the cathodes facilitates film breakdown there. Consequently, alloys containing cathodic constituents are attacked where these constituents are situated, while polycrystalline superpurity material is attacked in the grain boundaries.

8738 Rates of Oxidation of Germanium. J. T. Law and P. S. Meigs. *Electrochemical Society, Journal,* v. 104, Mar. 1957, p. 154-159.

Oxidation rates of the (110), (111), and (100) faces of a crystal were measured between 450 and 700 C at various oxygen pressures. Oxidation rates were inversely dependent on oxygen pressure at and above 550 C, and no differences in behavior between faces were observed. At 500 C only the (110) face oxidized appreciably.

8739* (Czech.) Scale Formation. **Vznik okují.** Pavel Gröbner. *Hutník,* v. 6, Dec. 1956, p. 364-366.

The causes of scale on steel; its structure; effects of heat; chemical reactions; effects of alloying elements.

8740 Stress-Corrosion Cracking of Austenitic Stainless Steels in Chemical Plant Equipment. William C. Rion, Jr. *Industrial and Engineering Chemistry,* v. 49, pt. 1, Mar. 1957, p. 73A + 3 pages.

These case histories of condensers and heat exchangers, cooling coils, and contact with wet thermal insulation may aid in solving stress-corrosion cracking failures.

8741* (Russian.) Thermogalvanic Corrosion. **Termogalvanicheskaia korroziia.** V. V. Gerasimov and I. L. Rozenfeld. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk,* no. 1, Jan. 1957, p. 29-31.

Thermogalvanic corrosion is the result of electric current produced when different parts of the same metal have different temperatures and are placed in an electrolyte. The hotter section was always the anode. Investigated thermogalvanic currents in Cu, Fe, Ni, and Pb in neutral, basic, and acid solutions.

8742 Measurement of the Corrosion Rate of Iron by Polarization Techniques. W. J. Schwerdtfeger. *Journal of Research, National Bureau of Standards,* v. 58, Mar. 1957, p. 145-153.

Techniques previously shown to be applicable to low-carbon steel exposed to corrosive soils are also shown to apply to low- and medium-carbon steels in a NaCl solution having a concentration of 2,000 p.p.m.

8743 Influence of Crystallographic Orientation on the Corrosion Rate of Aluminum in Acids and Alkalies. Theodore H. Orem. *Journal of Research, National Bureau of Standards,* v. 58, Mar. 1957, p. 157-167.

The gross effect of corrosion by these media on spherical single crystals is such as to cause them to acquire the general shape of equilateral octahedra, when attacked by an aqua regia-HF mixture, and of cubes when attacked by NaOH solution.

8744 An Apparatus for Investigating the Low-Pressure Oxidation Kinetics of Hot Metals. L. G. Carpenter and W. N. Mair. *Journal of Scientific Instruments,* v. 34, Mar. 1957, p. 110-114.

The data of a typical Ti oxidation experiment are given.

8745* (Hungarian.) Tests on the Application of Aluminum in the Manufacture of Tanning Materials. **Kísérletek alumíniumnak a cserzöanyaggyártásban történö felhasználására.** Mária Holló Gyenes. *Kohászati Lapok,* v. 11, Oct. 1956, p. 475-478.

Investigation to determine the resistance of Al to various compounds during tanning-materials production. Experimental arrangement. Materials investigated.

8746 Statistical Analysis of the Corrosion of Uranium. I. Tests in Moist Helium and the Effects of Impurities. James T. Waber. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission),* LA-1355, Jan. 1952, 23 p. (UF767 U3La Contin.)

Corrosion data from seven duplicate runs were analyzed statistically and the slope and rate constants calculated. Carbon, and possible iron, appear to exert the greatest effect on the slope.

8747* (German.) The Problem of Stress Corrosion in Non-Ferrous Alloys. **Zur frage der Spannungskorrosion bei Nichteisenmetall-Legierungen.** *Metall,* v. 11, Mar. 1957, p. 193-196.

Develops an electrochemical theory of stress corrosion. Even in homogeneous alloys there can be electrochemical heterogeneity; the grain boundaries act as anodes with respect to the rest of the crystal surfaces.

8748* (Polish.) Cathodic Protection of Ship Hulls. **Katodowa ochrona kadłubów okrętowych. I.** Potential Measurement on Ships in Gdansk and Gdynia Harbors. Tests of Cathodic Protection on a Model of a 10,000 DWT Ship. **Pomiary potencjałów statków w basenach Gdańska i Gdyni Badania ochrony katodowej na modelu kadłubu 10,000 TDW.** R. Juchniewicz. *Przemysł Chemiczny,* v. 13, Jan. 1957, p. 26-30.

A steel model (working surface 3.5 sq. m.) was cathodically polarized by a current of 7.5 mv. to a protective potential determined against a Ag-AgCl electrode.

8749* Corrosion Studies of Carbon Steel in Alkaline Pulping Liquors by the Potential-Time and Polarization-Curve Methods. II. Mixtures of White With Oxidized or Nonoxidized Black Liquor. W. A. Mueller. *Tappi,* v. 40, Mar. 1957, p. 129-140.

Influence of secondary factors such as stirring, formation of iron sulfide deposits on the electrodes, and duration of the experiment.

8750* (German.) On the Anodic Behavior of Brass in Copper and Zinc Cyanide Solutions. **Über das anodische Verhalten von Messing in Lösungen von Kupfer- und Zinkcyaniden. II.** Willi Machu, A. M. Azzam, and G. M. Habashi. *Werkstoffe und Korrosion,* v. 8, Feb. 1957, p. 61-66.

Solubility of the anodes is conditioned mainly by the bulk concentration of the electrolyte, the content of free NaCN, and the current density; Zn and Cu dissolve independently.

8751* (German.) Indications on How to Treat and How to Use Platinum Crucibles and Trays. **Hinweise auf die Behandlung und Verwendung von Platin-Tiegein und -Schalen.** E. Lingnau. *Werkstoffe und Korrosion,* v. 8, Feb. 1957, p. 67-69.

Numerous experiments can be carried out in Pt containers without adverse effect on the samples.

8752 Corrosion and Ignition of Titanium Alloys in Fuming Nitric Acid. John B. Rittenhouse, Nicholas D. Stolica, Stephen P. Vango, Julia S. Whittick, and David M. Mason. *Wright Air Development Center Materials Laboratory, WADC Technical Report* 56-414, Feb. 1957, 57 p. (TL507 Un3.18w Vis.)

Corrosion rates increase with increasing NO_2 in the range 0 to 20% and decrease with increasing H_2O in the range 0 to 2%. Ignition or pyrophoric reactions can be initiated by impact or friction after exposure to fuming HNO_3 containing from 0 to 1.25% H_2O and from 2.5 to 28% NO_2 for periods of time exceeding 4 hr.

8753* (Russian.) Determining Inter-Crystalline Corrosion by Measuring Internal Friction. **Opredelenie mezhkristallitnoi korrozii putem izmereniia vnutrennego treniia.** M. A. Vedeneeva, A. V. Panov, and N. D. Tomashov. *Zavodskaia Laboratoriia,* v. 23, Jan. 1957, p. 64-67.

The degree of internal friction is obtained by setting up transverse vibrations in the specimen and obtaining their resonance curves.

See also: **8415** (anodic dissolution of Zn); **8424** (salt-spray testing); **8542** (corrosion in boiler furnaces); **8543** (corrosion by flue gas); **8544** (H_2SO_4 corrosion by flue gases); **8972** (structure of scale on Ni steels).

METALS—EXTRACTION AND REFINING

8754* (Portuguese.) Hydrometallurgy and Zinc Extraction From Silicate Ores. **Extração de zinco de minérios silicatados por hidrometalurgia.** Hugo Lodewijk Radino. *ABM (Boletim da Associação Brasileira de Metais)*, v. 12, Oct. 1956, p. 355-366.

Hydrometallurgical separation of Zn from silicate ores is difficult because the gelatinous silicic acid that forms prevents the ore suspension from settling. A new process and its applications are presented.

8755* (German.) Purest Aluminum. **Reinstaluminium.** A. Brenner. *Berg- und Hüttenmännische Monatshefte der Montanistischen Hochschule in Leoben*, v. 101, Dec. 1956, p. 264-267.

Production of ultra-high-purity Al total (inclusions below 0.01%) for alloying purposes with Mg and other metals. Properties of alloys obtained.

8756 Present Status of Temperature Control of Steel During Melting and Pouring. K. Guthmann. *Henry Brutcher Translation No.* 3705, 16 p. (Abridged from *Stahl und Eisen*, v. 75, no. 20, 1955, p. 1317-1324.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 269, v. 5, Jan. 1956.

8757 Vacuum Melting of Steel for Transformer Sheet. G. A. Garnyk and A. M. Samarin. *Henry Brutcher Translation No.* 3843, 8 p. (Condensed from *Stal'*, v. 16, no. 6, 1956, p. 514-518.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14693, v. 5, Nov. 1956.

8758 Continuous Casting of Rimmed Basic Bessemer Steel. H. Kosmider, H. Neuhaus, and A. Weyel. *Henry Brutcher Translation No.* 3845, 21 p. (From *Stahl und Eisen*, v. 76, no. 11, 1956, p. 668-678.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 11161, v. 5, Sept. 1956.

8759 Desulfurization of Liquid Pig Iron With Powdered Calcium Carbide. S. Kawabata. *Henry Brutcher Translation No.* 3850, 6 p. (From *Tetsu to Hagane*, v. 41, no. 3, 1955, p. 193-195.) Henry Brutcher, Altadena, Calif.

Effects of particle size of the carbide and temperature of pig iron and carrier gas upon percent desulfurization. Comparison with use of lime.

8760 Solidification and Heat Transfer in Continuous Casting. A. A. Skvortsov, A. D. Akimenko, and K. P. Korotkov. *Henry Brutcher Translation No.* 3852, 15 p. (From *Stal'* v. 16, no. 10, 1956, p. 883-890.) Henry Brutcher, Altadena, Calif.

Fluctuations of coefficient of heat transfer from slab to mold, spray cooling water, and air. Theoretical treatment and calculations.

8761 Sources of Nonmetallic Inclusions in Bearing Steels Identified by Use of Radioactive Calcium. V. A. Grigoryan and A. M. Samarin. *Henry Brutcher Translation No.* 3858, 16 p. (From *Izvestiya Akademii Nauk SSSR, OTN*, no. 3, Mar. 1954, p. 91-101.) Henry Brutcher, Altadena, Calif.

Data on inclusions in 1% C, 1.5% Cr bearing steel originating from slag, furnace lining, ladle brick, spouts, and components of bottom-pour assemblies.

8762* (French.) Preparation and Properties of Rare-Earth Metals. **Préparation et propriétés des métaux des terres rares.** Félix Trombe. *Chimie & Industrie*, v. 77, Feb. 1957 p. 277-288.

Rare-earth metals are prepared by the electrolysis of their molten salts, or by displacement with highly positive metals such as Ca.

8763* (German.) Progress Realized in the Continuous Casting of Tin Bronzes. **Fortschritte beim kontinuierlichen Stranggiessen von Zinnbronzen.** E. C. Ellwood. *Giesserei*, v. 44, Feb. 28, 1957, p. 121-125.

Continuous casting of semi-finished products for rolling mills and their evolution.

8764* (Czech.) Artificial Blast-Furnace Blast Humidifications. **Umělé vlhčení větru pro vysoké pece.** Miroslav Prouza. *Hutnické Listy*, v. 12, Feb. 1957, p. 97-102.

The water vapor affects material and thermal balances of the blast furnace and accelerates oxidation reduction processes. Degree of blast wetting is determined by factors such as climatic conditions and capacity of blast heaters.

8765* (Czech.) Operating Experience With Chrome Magnesite Roofs in Open-Hearth Furnaces. **Některé zkušenosti z provozu Martinových pecí s chrommagnesitovou klenbou.** František Procháska. *Hutník*, v. 6, Dec. 1956, p. 362-364.

Preparation of materials; problems; construction of the roof. Recommends that all open-hearth furnaces in Czechoslovakia be made with chrome-magnesite roofs.

8766 New Process Puts Higher Profit in Low Grade Ores. *Iron Age*, v. 179, Apr. 4, 1957, p. 102-103.

New smelting process permits yields up to 95% from ores usually considered commercially worthless. Ferro-manganese competing in price with that from higher grade ores is produced from a 12% Mn ore.

8767 The Climate of the Open-Hearth Furnace. J. H. Chesters. *Iron & Steel*, v. 30, Mar. 1957, p. 87-93.

General levels, fluctuations, and distribution of temperature; blast velocity and direction; fumidity and precipitation. (To be concluded.)

8768* (Japanese.) **Aerodynamic Constitution of Open-Hearth Furnace. III. Functions of the Lower Furnace.** Hidefumi A. Hasimoto. *Iron & Steel Institute of Japan, Journal*, v. 43, Feb. 1957, p. 117-121.

Air flow was studied by means of two- and three- dimensional models.

8769 Graphite Electrode Consumption in Electric Arc Furnaces, a Statistical Analysis. T. A. Cosh. *Iron and Steel Institute, Journal*, v. 185, Mar. 1957, p. 328-332.

Electrode consumption is closely related to the electrode surface area within the furnace in such a way that a reduction in the surface area is effective in producing a reduction in electrode consumption. Diameter, not length, should be reduced.

8770* (Russian.) Using Radioactive Isotopes to Investigate the Continuous Casting of Steel. **Issledovanie protsessa nepreryvnoi razlivki stali s pomoshch'iu radioaktivnykh izotopov.** B. N. Katomin and V. S. Rutes. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 123-135.

Apparatus and procedure for studying heat exchange and the movement of the solidification front. A decisive factor in heat exchange and crystallization is the gas formed in the shrinkage space between the walls of the ingot and the surface of the solidifying casting.

8771 The Purification of Plutonium by a Thenoyltrifluoroacetone (T.T.A.) Process. J. G. Cuninghame and G. L. Miles. *Journal of Applied Chemistry*, v. 7, Feb. 1957, p. 72-81.

Data are presented for the extraction of U, Zr, Ru, Fe, and Cr.

8772 Sponge Iron in Electric Arc Furnaces. John L. Stalhed. *Journal of Metals*, v. 9, Feb. 1957, p. 246-249.

Swedish experience and technique in the use of sponge iron. Advantages are higher yields, fewer rejects, and scrap lower in impurities, especially Cr, Cu, and Sn.

8773 Comparison of Blast Furnace Penetration With Model Studies. J. B. Wagstaff and W. H. Holman. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Mar. 1957, p. 370-376.

A new correlation of the penetration of air into the blast furnace. Critical examination of data taken by rodding the tuyeres.

8774 Use of Oxygen at Abbey Melting Shop, Steel Co. of Wales Ltd. A. J. Kesterton. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Feb. 1957, p. 274-280.

Use of a water-cooled probe for jetting O into an open-hearth furnace. Effects of C elimination. Slag control for S elimination.

8775 An Investigation of the Iodide Method of Refining Zirconium. II. Lower Zirconium Iodides and the Influence of Tetra-Iodide Pressure Upon the Rate of Metal Deposition. V. S. Emelyanov, P. D. Bystrov, and A. I. Evstyukhin. *Journal of Nuclear Energy*, v. 4, Feb. 1957, p. 253-261 + 1 plate. (Translated from *Atomnaya Energiya*, v. 1, no. 3, 1956, p. 122.)

When the refining process proceeds slowly, formation of a lower iodide causes the complete disappearance of solid tetraiodide and a consequent change of it vapor pressure in the vessel, and this in turn leads to a change in the rate of metal deposition.

8776* (Hungarian.) Rate of Dissolution of Aluminate in Cryolite Solution. **A timföld oldódási sebessége kriolitolvadékban.** Ferenc Mosóczi. *Kohászati Lapok*, v. 11, Oct. 1956, p. 465-471.

Description of apparatus and experimental method. Characterization of factors influencing dissolution rate.

8777 The Need for Less Sulphur in Deoxidized Steel. H. W. McQuaid and Norman P. Goss. *Metal Progress*, v. 71, Mar. 1957, p. 65-71.

Special equipment for rapid desulfurization is recommended since more than 0.020% S in Al-killed, fine-grained steel produces undesirable ferrite in supposedly all-martensitic microstructures.

8778 Equilibrium Considerations on Uranium Dioxide Drossing of Irradiated Uranium. A. G. Buyers and E. W. Murbach. *North American Aviation, Inc. (U. S. Atomic Energy Commission)*, NAA-SR-1793, Mar. 1957, 15 p. (UF767 Un3.1na Contin.)

Equilibrium constants and changes in standard free energies, at the temperatures, 1473, 1548, and 1673 K, were calculated for skin-uranium and crucible-urania molten irradiated uranium contacting.

8779 Construction and Operation of a Laboratory Scale Arc Melting Unit. J. F. Kuchta and S. Isserow. *Nuclear Metals, Inc. (U. S. Atomic Energy Commission)*, BMI-1142, Feb. 1956, 18 p. (UF767 Un3.1nm Contin.)

8780 (German.) One Year of L-D Oxygen Refining Process. **Ein Jahr LD-Sauerstoff-Frischverfahren.** 56 p. 1954. Vereinigte Österreichische Eisen-und Stahlwerke, Linz-Donau, Austria. (TN750 V58j Over.)

Report on oxygen steelmaking first introduced at the Linz-Donau mill in 1953. Technical and economic data.

8781* (Hungarian.) Calculation of Fusing Phenomena. **Olvasztási jelenségek számítása.** Sándor Polgáry. *Öntöde*, v. 7, Oct. 1956, p. 217-220.

Calculation of qualitative changes; underlying laws of these changes. Suggested formulas and practical data that can be calculated with them.

8782 Proceedings of the Thirty-Ninth Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E. v. XXXIX. 305 p. 1956. American Institute of Mining, Metallurgical, and Petroleum Engineers, New York. (TS1 Am35o Vis.)

Numerous papers dealing with acid and basic operations, refractories and masonry, operating metallurgy, desulfurization, cold metal and basic foundry practice, and furnace operation and combustion.

8783* (French.) A Brief Report on the Investigation Performed on the Low Shaft Furnace of Ougrée. **Compte rendu succinct des recherches sur le bas fourneau d'Ougrée.** *Revue Universelle des Mines*, v. 13, ser. 9, Feb. 1957, p. 82 + 6 pages.

Pilot plant experience during three years of operation.

8784* (French.) Using Vacuum in Metallurgy. **L'emploi du vide en métallurgie.** L. Colombier. *SIM—Documentation Métallurgique*, no. 28, Oct.-Dec. 1956, p. 257-264.

Melting and casting in vacuum. Chemical and physical reactions in elimination of gases and volatile impurities.

8785* (German.) Study of the Physical and Chemical Processes Occurring During the Casting and Solidifications of Steel. **Über die physikalischen und chemischen Vorgänge beim Giessen und Erstarren von Stahl.** Hans Kosmider, Herbert Neuhaus, Hans-Joachim Kirschning, and Werner Münstermann. *Stahl und Eisen*, v. 77, Feb. 7, 1957, p. 133-143.

Measurements of steel temperature from the furnace to solidification in ingots of 1.4 to 4.8 tons. Behavior of rimming steels during the boiling period. Inclusions and segregation processes.

8786 (German.) Construction and Operation of Modern 70 Ton Electric Arc Furnaces for Steel Melting. **Bau und Betrieb von Neuzeitlichen 70-t-Lichtbogen-Elektrostahlöfen.** Edmund Pakulla. *Stahl und Eisen*, v. 77, Feb. 21, 1957, p. 197-204.

Economics of the selection of large-capacity electric arc furnaces. Description of an electric steel plant, comprising two 70 ton electric arc furnaces.

8787* (Russian.) Investigation of Heat Exchange and Reduction Processes When Using a Fluxed Sinter. **Issledovanie teploobmennykh i vosstanovitel'nykh protsessov pri rabote na ofliusovannom aglomerate.** N. N. Babarykin and F. A. Iushin. *Stal'*, v. 17, Jan. 1957, p. 7-15.

The temperature of burden and gas in the upper part of the blast furnace increases somewhat. The maximum speed of reduction is observed in the upper and lower parts of the burden shaft.

8788* (Russian.) Hydrodynamics of Molten Steel in Molds. **Gidvodinamika zhidkoi stali v islozhnice.** A. A. Zborovsky, L. K. Strelkov, M. K. Skul'sky, and E. I. Rabinovich. *Stal'*, v. 17, Jan. 1957, p. 24-30.

Investigation of hydrodynamic phenomena during solidification, carried out by means of radioactive tracers. Vigorous mixing occurs. The direction of circulating streams for rimmed and killed steels are not identical.

8789* (Russian.) Influence of Deoxidation With Aluminium on Quality of Structural Steel. **Vliianie raskisleniia aliuminiem na kachestvo konstruktsionnoi stali.** N. G. Antropova, Z. M. Kalinina, and A. K. Petrov. *Stal'*, v. 17, Jan. 1957, p. 64-69.

Aluminum that is not completely consumed forms nitride films at grain boundaries, as a result of liquation and adsorption. This has an essential influence on ductility of ingots at rolling, texture of fracture, and on properties of rolled steel.

8790* (Russian.) Smelting of Fluxed Sinter, Made of Krivoy Rog Iron Ores, in the Blast Furnace. **Domennaia plavka ofliusovannogo aglomerata iz krivorozhskikh rud.** I. V. Raspopov, Ia. P. Kulikov, Ia S. Gorbanev, and G. D. Muguev. *Stal'*, v. 17, Feb. 1957, p. 99-103.

8791* (Russian.) Remelting of High Manganese Steel in the Open-Hearth Furnace. **Pereplav vysokomargantsovistoi stali v martenovskoi pechi.** P. T. Khokhlov. *Stal'*, v. 17, Feb. 1957, p. 179-181.

8792* (Russian.) Influence of Hot-Top Configuration on the Macrostructure of Ingots. **Vliianie formy pribyl'noi nadstavki na makrostrukturu slitka.** A. K. Petrov and B. P. Okhrimovich. *Stal'*, v. 17, Feb. 1957, p. 130-135.

A broadened hot-top eliminates retention of crust at a joint and improves the macrostructure of the ingots.

8793* (Russian.) The Experience of Conversion of Oil-Fired Open-Hearth Furnaces to Natural Gas Firing. **Opyt perevoda mazutnykh martenovskikh pechei na otoplenie prirodnym gazom.** V. P. Borodin, P. E. Darmanian, I. A. Iudson, and L. S. Shevandina. *Stal'*, v. 17, Feb. 1957, p. 124-129.

Natural gas as a substitute for fuel oil in the open-hearth furnaces has a number of economic and technical advantages.

8794 Continuous Casting Comes to Carbon Steel. *Steel*, v. 140, Mar. 25, 1957, p. 108 + 2 pages.

This process, still considered experimental, is ready to break into volume production.

8795 Consumable Electrode Arc-Melting of Cold-Compacted Thorium Powder. R. Witt. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission)*, SEP-209, Apr. 1956, 28 p. (UF767 Un3.1se Contin.)

Relationships of specific variables such as power at the arc, crucible size, electrode size, and A pressure were determined relative to minimum requirements to obtain sound ingots.

8796* (English.) **Fundamental Studies on Copper Smelting. V. Mutual Dissolution Between Matte and Slag Produced in System Cu_2S-FeS-FeO-SiO_2.** Akira Yazawa. *Technology Reports, Tôhoku University*, v. 21, no. 1, 1956, p. 31-50.

Mutual solubilities increase with the decrease in SiO_2 and Cu_2S content, and with the increase in FeO content. In the region where both SiO_2 and Cu_2S are small in content, the phases of matte and slag disappear, yielding a single liquid phase.

8797* (German.) Purifying Lead of Silver and Bismuth. **Entsilberung und Entwismutierung von Blei.** T. Ronald A. Davey. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, Feb. 1957, p. 53-60.

Pb-Ag-Zn phase diagram. Calculation of Zn requirement. Effect of change in Ag content. Comparison of various methods.

8798* (German.) Investigation of the Mutual Behavior of PbO-Sb_2O_5 in Liquid Smelt. **Untersuchungen über das gegenseitige Verhalten von Blei-Antimon-Oxyden im schmelzflüssigen Zustande.** Helmut Hennig and Ernst Justus Kohlmeyer. *Zeitschrift für Erzbergbau und Metallhüttenwesen*, v. 10, Feb. 1957, p. 64-71.

Investigation of the solubility condition and reaction processes in relation to metal separation.

See also: **8001** (all-basic open-hearth roofs); **8006** (silica brick in electric furnace roofs); **8373** (shielding of induction furnaces); **8627** (reduction kinetics); **8969** (effects of pouring practice on structure of steel ingots); **9152** (hydrometallurgy reactions).

METALS—FINISHING, POLISHING, AND CLEANING

8799* (Czech.) Progress in Pickling. **Pokroky v technologii moření.** Miroslav Jaroš. *Hutník*, v. 6, Nov. 1956, p. 335-336.

New pickling methods; acids; inhibitors; additives; safety of personnel; regeneration of mixtures.

8800* (Czech.) Hydrogen-Caused Defects in Pickling Steel. **Závady při moření oceli způsobené vodíkem.** A. Dvořák. *Hutník*, v. 6, Nov. 1956, p. 337-341.

The role of H; diffusion of H during the pickling; effects of H on the properties of steel; theory of H embrittlement; means of preventing H-caused defects.

8801 Using Burn-Off Ovens to Dry-Clean Metal Surfaces. P. C. Bardin. *Industrial Finishing*, v. 33, Mar. 1957, p. 40 + 4 pages.

Metal products are subjected to oven heat anywhere from 400 to 650 F. This causes surface oils and impurities to vaporize and disappear, leaving a clean, dry surface with rust inhibiting qualities.

8802 Finishing Nickel and High Nickel Alloys. Lester F. Spencer. *Metal Finishing*, v. 55, Mar. 1957, p. 50 + 6 pages.

Recommendations for roughing down welds, polishing, buffing, brushing, and bobbing; materials used for finishing; specific examples.

8803 Chemical Brightening of Aluminium. A. W. Brace. *Metal Industry*, v. 90, Feb. 22, 1957, p. 147 + 4 pages.

Basic principles; bath composition; equipment; measurement of film thickness, brightness, abrasion resistance, and corrosion resistance.

8804* (German.) Cleaning and Removing Rust From Steel. **Die Reinigung und Entrostung von Stahl. II.** K. A. van Oeteren-Panhäuser. *Metalloberfläche*, v. 11, Mar. 1957, p. B41-B48.

Blast cleaning techniques. Blast-sand preparation. Rust removal with pastes. Pickling procedures. Surface preparation for electroplating.

8805* (French.) Surface Treatment Prior to Galvanization: Scouring. **Traitement des surfaces en vue de la galvanisation: le dégraissage.** A. Herz. *Métallurgie et la Construction Mécanique*, v. 89, Jan. 1957, p. 49 + 1 page.

Generalization of scouring by use of an alkaline solution, surface tension, wetting agents, and influence of pH.

8806* Finishing Methods for Aluminium. *Product Finishing*, v. 10, Mar. 1957, p. 82-99.

Cleaning methods; mechanical finishes; chemical, anodizing, and electropolishing treatments; coloring anodic coatings.

8807* Fundamentals of Barrel Finishing. I. Equipment and Methods. T. W. Black. *Tool Engineer*, v. 38, Apr. 1957, p. 109-118.

8808 Flame Washing of Steel Castings. A. F. Chouinard. *Welding Journal*, v. 36, Mar. 1957, p. 219-224.

Oxyacetylene flame cleaning saves time, cuts costs, and helps to eliminate bottlenecks.

See also: **8985** (structure of polished Au); **9281** (cleaning—waste disposal).

METALS—FOUNDRY PRACTICE

8809* (German.) Investigations of Aluminum-Magnesium Casting Alloys. **Untersuchungen über Gusslegierungen auf Aluminium-Magnesium-Basis.** M. Kato and Y. Nakamura. *Aluminium*, v. 33, Mar. 1957, p. 152-162.

Reaction of heats with graphite, steel, and cast iron crucibles, and with wet and dry sand molds of various compositions.

8810* (German.) New Induction Furnaces in the Light Metal Foundry. **Neue Induktionsöfen in der Leichtmall-Giesserei.** J. P. Rohn. *Aluminium*, v. 33, Mar. 1957, p. 170-172.

A critical review of furnaces and a description of new types of double-hearth induction furnaces.

8811* The Design and Operation of Two Water-Cooled Cupolas. D. W. Berridge and J. R. Hawley. *British Foundryman*, v. 50, pt. 2, Feb. 1957, p. 53-62.

Deals with a 27-in. internal diameter basic cupola for the production of spheroidal graphite iron, and a conversion from a standard cupola which has an acid-lined well.

8812* Flowability of Foundry Sands. A. Tipper. *British Foundryman*, v. 50, pt. 2, Feb. 1957, p. 62-65.

Theoretical aspects; test procedures.

8813* (French.) New Results From Ingot Mold Tests. **Nouveaux résultats d'essais de lingotières.** G. Bauer, J. Duflot, and A. Gibeau. *Fonderie*, no. 133, Feb. 1957, p. 64-79.

Results obtained in constructing lighter ingot molds of open-hearth steel.

8814 Practical pH Control for Molding Sand. Edward C. Zuppann. *Foundry*, v. 85, Apr. 1957, p. 106-110.

Data to provide a clearer understanding of pH content and its effect on casting quality.

8815 Cleaning Costs Are Affected by What You do to a Mold. Hubert Chappie. *Foundry*, v. 85, Apr. 1957, p. 116-121.

Observing correct procedures between molding and pouring can reduce cleaning costs in any foundry.

8816 Coremaking Practices in the Brass Foundry. Harry St. John. *Foundry*, v. 85, Apr. 1957, p. 128-131.

Survey of coremaking practices points out equipment and methods that must be modernized.

8817 The Carbon-Dioxide Process of Mould and Core Production. G. E. Parramore. *Foundry Trade Journal*, v. 102, Mar. 14, 1957, p. 325-331.

History of the process; preparation and storage of sand; pattern equipment; gassing techniques; covers and manifolds; mold production. (To be continued.)

8818* (German.) Investigation on the Behavior of Williams Type Feeders as Down-Gates for Steel Castings. **Untersuchung über das Verhalten von Williams-Masseln als Speisetrichter für Stahlgusstücke.** Heinz-Ulrich Doliwa. *Giesserei*, v. 44, Feb. 28, 1957, p. 129-133.

Conditions for the combination of Williams feeders and open gates at atmospheric pressure.

8819 Dextrose Binder Speeds Core Production. C. F. Lourich. *Iron Age*, v. 179, Apr. 4, 1957, p. 104-105.

Replacing conventional core oils with a dry form of binder derived principally from corn sugar is speeding up core production. Cores bake through in 40 to 50% less time.

8820* (Russian.) Gating Systems for Magnesium Alloy and Aluminum Alloy Castings. **Litnikovye sistemy dlia otlivok iz magnievykh i aliuminievykh splavov.** M. M. Vasilenko. *Liteinoe Proizvodstvo*, no. 2, Feb. 1957, p. 2-3.

A discussion of gating systems and how they effect the quality of the casting. Suggestions on cross sectional area of gates in relation to area of casting.

8821* (Russian.) Automation of Investment Casting. **Avtomatizatsiia proizvodstva otlivok po vyplavliaemym modeliam.** I. V. Efimov. *Liteinoe Proizvodstvo*, no. 2, Feb. 1957, p. 6-8.

Construction and operation of a device for increasing the number of satisfactory investment patterns produced per shift.

8822* (German.) Magnesium and Magnesium Alloy Castings. **Magnesium und seine Gusslegierungen.** K. Sautner. *Metall*, v. 11, Mar. 1957, p. 196-201.

General discussion of quantity produced annually in world; sources; production processes; applications of pure magnesium and magnesium alloys.

8823* (French.) The Use of Anthracite in Cast Iron Melting Operations. **Le problème de l'utilisation de l'anthracite dans les opérations métallurgiques de fusion de la fonte.** Léon Delvaux. *Revue Universelle des Mines*, v. 13, ser. 9, Feb. 1957, p. 57-83.

Physical instability of anthracite subjected to rapid increase of temperature, and resulting poor mechanical strength. The causes of "decrepitation", based on experiments, and its prevention. Testing anthracite in an experimental cupola furnace.

8824* (Czech.) Tilt Pouring of Steel Castings. **Reversní odlévání ocelových odlitků.** Miroslav Skala and Zdenek Kosnovsky. *Slévárenstvi*, v. 5, Jan. 1957, p. 2-4.

Methods and advantages; calculation of risers.

8825* (Czech.) Waste From a Vanadium Work as Molding Material. **Odpad z vanadovny jako formovací materiál.** Antonín Kubacký. *Slévárenstvi*, v. 5, Jan. 1957, p. 4-7.

Use of thermite slag as a material for molds and especially for cores.

8826* (Czech.) Experiences With the Production of a 140-Ton Ingot Mold. **Zkušenosti s výrobou 140 tunového odlitku kokily.** Josef Gajdušek and Jan Hladký. *Slévárenstvi*, v. 5, Jan. 1957, p. 8-13.

Casting procedures.

See also: **8051** (determination of gas in Al heats); **8686** (hot tears in steel castings); **8962** (structure of gray iron); **8979** (structure of Al castings); **9010** (quality control of non-ferrous castings); **9011** (quality control of Mg alloy castings).

METALS—HEAT TREATMENT

8827 Influence of Tempering Upon Hardness Retention of Electrosparked Surface Layers. G. P. Ivanov, V. A. Belyanin, and V. V. Borisova. *Henry Brutcher Translation No.* 3735, 6 p. (From *Metallovedenie i Obrabotka Metallov*, v. 1, no. 4, 1955, p. 48-51.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 2467, v. 5, Mar. 1956.

8828 On the Causes of Irreversible Temper Brittleness in Steels. E. A. Stetsenko. *Henry Brutcher Translation No.* 3813, 7 p. (From *Metallovedenie i Obrabotka Metallov*, v. 2, no. 7, 1956, p. 35-38.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14811, v. 5, Nov. 1956.

8829 Nitriding of Titanium in Ammonia. A. N. Minkevich, A. D. Taimer, and Yu. A. Zot'ev. *Henry Brutcher Translation No.* 3814, 14 p. (Abridged from *Metallovedenie i Obrabotka Metallov*, v. 2, no. 7, 1956, p. 39-48.) Henry Brutcher, Altadena, Calif.

Nitriding of forged powder-metallurgical Ti, cast Ti, and Ti-Cr and Ti-W alloys.

8830 Sulfidizing (of Steel and Cast Iron) in Fused Salts. E. M. Morozova and F. R. Florensova. *Henry Brutcher Translation No.* 3839, 10 p. (Abridged from *Stanki i Instrument*, v. 27, no. 5, 1956, p. 27-30.) Henry Brutcher, Altadena, Calif.

Influence of S impregnation on hardness, wear resistance, and coefficient of friction. Advantages of sulfidizing machine parts.

8831* (French.) Producing Uniform Temperatures in Heat-Treatment Furnaces. Importance of the Choice and Preparation of the Materials. **Obtention de températures homogènes dans les fours de traitement thermique. Importance du choix et de la mise en oeuvre des matériaux.** J. M. Carrasse. *Flamme et Thermique*, v. 9, Jan. 1957, p. 47-60.

Theoretical aspects. Principal parameters involved. A critical study of two installations and an attempt to classify furnaces according to their thermal requirements.

8832* (German.) Basic Considerations on the Hardening of Cast Iron. **Grundsätzliche Betrachtungen zur Härtung von Gusseisen.** Rudi Jonck. *Härterei-Technische Mitteilungen*, v. 8, no. 4, 1955, p. 19-33.

Tests were made on cast iron "GG-22" to determine effects of hardening temperature, critical range, diameter of specimen, quenching media, and decarburizing on oxidizing furnace atmospheres on hardness, structural changes, and cracking.

8833* (German.) Nitriding of Iron Alloys and Its Effects on Wear Resistance. **Das Nitrieren von Eisenlegierungen und seine Auswirkung auf den Verschleisswiderstand.** Johannes Müller. *Härterei-Technische Mitteilungen*, v. 9, no. 3, 1955, p. 25-44.

Various nitrided specimens were tested with a surface endurance testing machine and the effects of hardness and of N on wear were examined. Nitriding of steels and cast iron; application in various fields.

8834* (German.) The Cooling Capacity of Steel Hardening Oils and Their Place Among the Usual Cooling Media. **Das Absühlvefmögen der Härteöle und ihre Einordnung in die Reihe der gebräuchlichen Abkühlmittel.** Adalbert Rühenbeck. *Härterei-Technische Mitteilungen*, v. 10, no. 2, 1956, p. 9-27.

Test methods for determining the quenching effect of cooling media and other factors of the quenching process. Establishment of basic principles.

8835* (German.) Mechanization and Automation in the Thermal Treatment of Metallic Materials. **Mechanisierung und Automatisierung in der Wärmebehandlung metallischer Werkstoffe.** Hans Diergarten. *Härterei-Technische Mitteilungen*, v. 12, no. 1, 1956, p. 9-23.

Purposes, means, and methods of fully automatic machines for the separate handling of materials subjected to thermal treatment.

8836 How Long, How Fast to Heat Tool Steel. I. *Iron Age*, v. 179, Apr. 4, 1957, p. 97-99.

Effects of furnace temperature and surface brightness on heating time.

8837 Electrical Equipment for Continuous Annealing of Silicon Steel Strip. G. J. Hay and H. S. Fegely. *Iron and Steel Engineer*, v. 34, Mar. 1957, p. 78-85.

An all-magnetic amplifier regulating system, with the exception of loop control, is in successful operation on a major processing line. Increased reliability and reduced maintenance are achieved.

8838* (German.) Modern Special Furnaces for Annealing Rolls of Brass Strip. **Moderne Spezialöfen zum Glühen von Messingbandbunden.** F. Deutz and R. Jansen. *Metall*, v. 11, Feb. 1957, p. 120-127.

Description, theoretical data, and working methods for two gas-heated hearth-type furnaces. Material was cooled either in a water spray or in a buffer gas atmosphere.

8839 Slack Quenching of Steels. D. J. Blickwede and R. C. Hess. *Metal Progress*, v. 71, Mar. 1957, p. 97-103.

These quenching diagrams for several common engineering alloy steels enable the metallurgist to predict the course of transformation and the eventual microstructures and hardnesses of various sized parts quenched either in oil or water.

8840 Applications of Furnace Atmospheres. Clarence E. Peck. *Metal Progress*, v. 71, Mar. 1957, p. 104-112.

Prepared atmospheres are specified for bright annealing, bright hardening, and for carburizing or carbo-nitriding of all varieties of plain and alloy steels. Includes suggestions concerning the atmospheres conventionally used, their dew points, and their carbon potentials.

8841 Case-Hardening of Carbon and Alloy Steels. J. E. Jubb. *Metal Treatment and Drop Forging*, v. 24, Mar. 1957, p. 99 + 6 pages.

Metallurgical principles; use of solid compounds in box-carburizing; cyanide salt bath processes.

8842 Induction Heating for the Interstage Annealing of Components on High-Speed Press Lines. K. A. Zandstra. *Sheet Metal Industries*, v. 34, Mar. 1957, p. 177-188.

Practical applications; time of treatment is below two min. for either 600 or 900 C levels.

8843* (German.) The Full-Automatic Control of Modern Pit Furnaces. **Die vollautomatische Regelung neuzeitlicher Tieföfen.** Karl Rieder. *Stahl und Eisen*, v. 77, Feb. 7, 1957, p. 157-162.

Electrical control methods.

8844* (Russian.) The Use of Protective Coatings for Minimizing Metal Decarburization. **Primenenie zashchitnykh pokrytii dlia umen'sheniia obesuglerozhivaniia metalla.** S. Z. Judovich. *Stal'*, v. 17, Jan. 1957, p. 69-71.

Brushing the metal with sodium silicate solution before heating will sharply reduce rejections due to surface decarburization of Cr steel.

8845 Rockets for Steel Hardening. James A. Browning. *Welding Journal*, v. 36, Mar. 1957, p. 225-229.

Extremely fast heating rates and a water quench produce higher hardness values than do more conventional techniques.

See also: **8878** (heat treatment of Ti alloys); **8921** (forging furnaces); **8935** (heat treatment of Ti).

METALS—MECHANICAL AND PHYSICAL PROPERTIES

8846 (English.) **The Effect of Composition on the Stored Energy of Cold Work and the Deformation of Gold-Silver Alloys.** P. Greenfield and M. B. Bever. *Acta Metallurgica*, v. 5, Mar. 1957, p. 125-130.

Stored energy varies with composition by a factor of nearly 5 at room temperature and by nearly 3 at −195 C. It also varies with the temperature of deformation and, after working at −195 C, is approximately 2 to 5 times as large as after working at room temperature.

8847* Non-Propagating Cracks in Vee-Notched Specimens Subject to Fatigue Loading. N. E. Frost. *Aeronautical Quarterly*, v. 8, Feb. 1957, p. 1-20 + 4 plates.

Reversed direct stress and rotating bending fatigue tests were carried out on specimens of Al alloy, Ni-Cr steel, and mild steel.

8848 Magnetic Properties of Holmium and Thulium. B. L. Rhodes, Sam Legvold, and F. H. Spedding. *Ames Laboratory, (U. S. Atomic Energy Commission)*, ISC-701, Dec. 1955, 58 p. (UF767 Un3.1is Contin.)

8849* (German.) Specific Heat of Metallic Electrons. **Zur spezifischen Wärme der Metallelektronen.** F. Kaschluhn. *Annalen der Physik*, v. 19, Dec. 1956, p. 94-101.

The specific heat of electrons of standard conductive metals was calculated by a new method used in the case of low temperatures. The Fröhlich and the Bohm-Pines interactions were considered and results compared with those of other methods.

8850* (German.) Investigations of the Internal Demagnetization Factor. **Untersuchungen über den inneren Entmagnetisierungsfaktor.** G. Vogler. *Annalen der Physik*, v. 19, Dec. 1956, p. 229-232.

Measurement of the demagnetization factor of mixed bodies whose spheric, ferromagnetic particles are embedded in a non-magnetic substance.

8851* (German.) Tensile Test of Steel and Non-Ferrous Metals at High and Low Temperatures in a Hardness Testing Machine Provided With Strain Gages. **Zugversuche an Stählen und Nichteisenmetallen bei hohen und tiefen Temperaturen in einer harten Prüfmaschine unter Verwendung von Dehnungsmessstreifen zur Kraftmessung.** Albert Kochendörfer and Wilhelm Wink. *Archiv für das Eisenhüttenwesen*, v. 28, Jan. 1957, p. 41-48.

A hardness testing machine with strain gages for the inertia-free measurement of stress, tensile strength, breaking strain of various steels, and non-ferrous metals between −180 and 800 C.

8852* (German.) Structural Hardness and Magnetic Saturation of Heat-Resistant Chromium-Manganese Steels With 2 to 6% Ni. **Gefüge, Härte, Kerbschlagzähigkeit und magnetische Sättigung hitzebeständiger Chrom-Mangan-Stähle mit 2 bis 6% Ni.** Helmut Krainer. *Archiv für das Eisenhüttenwesen*, v. 28, Feb. 1957, p. 81-89.

Condition of formation of sigma phase from ferrite in connection with Mn content in steel. Possibilities of formation of sigma-phase from austenite.

8853* (English.) **On the Connection Between Electrical Resistivity and Potential Energy in Pure Metals.** G. Borelius. *Arkiv för Fysik*, v. 11, no. 3, 1956, p. 291-295.

In pure metals the potential energy and the thermal expansion are both dependent on the disorder of the lattice caused by thermal agitation.

8854 Application of a Microfocus Laue Technique to the Study of Deformation in Aluminium Single Crystals. R. A. Coyle, A. M. Marshall, J. H. Auld, and N. A. McKinnon. *British Journal of Applied Physics*, v. 8, Feb. 1957, p. 79-83.

Technique reveals features of the deformation which are not shown by other methods. Kink band images are shown to be caused by over-lapping images and not extinction effects at the low amounts of strain (1%) used.

8855* Methods of Notched-Toughness Testing of Ship Plate Steel. N. Christensen and B. Augland. *British Welding Journal*, v. 4, Feb. 1957, p. 69-87.

The notch-toughness properties of fourteen ship plate steels and one Mo-alloy steel were studied by means of various Charpy impact test methods, by impact testing of bars in full plate thickness, and by static tensile bend and slow bend methods. Results indicate that highly ductile, fully killed steels may not be able to arrest brittle fractures in proportion to their ability to resist fracture initiation.

8856* Influence of External Energy on Brittleness in Bend Tests. A. Almar-Naess. *British Welding Journal*, v. 4, Feb. 1957, p. 88-97.

External energy released from test equipment has the same qualitative effect as internal energy. Transition temperatures of notched bend specimens can be influenced by the type of testing machine. Likelihood of brittle fracture is dependent on the stiffness of the entire structure.

8857 Case Hardness Measurements on Steels at High Temperatures. G. F. Belyaeva and M. G. Lozinskii. *Henry Brutcher Translation No.* 3733, 5 p. (Abridged from *Metallovedenie i Obrabotka Metallov*, v. 1, no. 3, 1955, p. 54-57.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 2466, v. 5, Mar. 1956.

8858 Properties of High-Temperature-Strength Austenitic Steels Melted Under Reduced Pressure. K. Bungardt and H. Sychrovsky. *Henry Brutcher Translation No.* 3807, 26 p. (Abridged from *Stahl und Eisen*, v. 76, no. 16, 1956, p. 1040-1049.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 14831, v. 5, Nov. 1956.

8859 Thermal and Electrical Conductivity of Rhodium, Iridium, and Platinum. G. K. White and S. B. Woods. *Canadian Journal of Physics*, v. 35, Mar. 1957, p. 248-257.

8860 Drawn Steel Has Unique Properties. *Canadian Metals*, v. 20, Mar. 1957, p. 22.

Free machining bar steel, hot-drawn for special properties, gives Rockwell C of 30, tensile strength of 140,000 psi. and a yield strength of 125,000 psi.

8861* (French.) Measuring Deviations From Ohm's Law and the Scintillation Effect of Very Thin Layers of Silver, Gold, and Aluminum. **Mesure des écarts à la loi d'ohm et de l'effet de scintillation présentés par des couches très minces d'argent d'or et d'aluminium.** Clement Uny and Nicolas Nifontoff. *Comptes Rendus*, v. 244, Feb. 4, 1957, p. 729-732.

8862* (French.) Resistance of Metals to Repeated Impact Stresses. **Sur la résistance des métaux aux chocs répétés.** Jean Fossiez, Raymond Sitte, and Stanislas Ziembinski. *Comptes Rendus*, v. 244, Feb. 18, 1957, p. 1008-1011.

Behavior of ARMCO iron and cemented Cr-Ni-steel specimens subjected to frequent stress. Plastic deformations with 50% elongation and elastic deformations were studied.

8863* (Russian.) Heat Resistance of Certain Binary, Ternary, Four- and Five-Component Nickel Alloys at 800°. **Zharoprochnost splavov nekotorykh dvoinykh, troinykh, chetvernykh i piaternykh sistem pri 800°.** I. I. Kornilov and L. I. Priakhina. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 70-72.

The study of partial structural diagrams showed that Cr, W, Ti, and Al form solutions of a much higher concentration with Ni than Zr, Be, B, C or N.

8864* (Russian.) Determination of Heat Conductivity of Metals and Alloys Under Heat Equilibrium Conditions, Using an Arc Dicharge. **Issledovanie teploprovodnosti metallov i splavov v usloviiakh teplovogo ravnovesiia s ispol'zovaniem dugovogo razriada.** G. E. Zolotukhin. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 508-512 + 1 plate.

8865 Fatigue of Cast Iron. H. Morrogh. *Foundry Trade Journal*, v. 102, Feb. 21, 1957, p. 239-244.

Effect of surface rolling on fatigue properties of both nodular and flake-graphite irons. Effects of elevated and low temperatures, surface finish, and annealing.

8866 The Effects of Irradiation on the Tensile Properties of Uranium. R. E. Hueschen, R. S. Kemper, and W. S. Kelly. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-41690, Feb. 1955, 28 p. (UF767 Un3.1hw Contin.)

Data on U irradiated at 150 and 350 C after exposures from 0.018 to 0.075% total atomic burnup.

8867* (German.) Residual Stress Formation During Steel Hardening and Its Effect on the Warping and Cracking of Hardened Steels. **Entstehung der Eigenspannungen bei der Stahlhärtung und ihre Bedeutung für das Verziehen und die Rissbildung in gehärteten Stählen.** Erich Scheil. *Härterei-Technische Mitteilungen*, v. 7, no. 4, 1955, p. 9-27.

Compressive and tensile strains were determined in thermal or transformation conditions and were measured on a spar model low in C. Cracking was studied in the same cases.

8868* (Czech.) The Influence of Deformation Occuring at Room Temperature on the Creep Behavior of Mild Carbon Steel. **Vliv deformace za normální teploty na tečení měkké uhlíkové oceli.** Roman Šejnoha. *Hutnické Listy*, v. 12, Feb. 1957, p. 102-109.

At low stresses creep accelerates owing to the influence of cold working; at high stresses it slows down. At a constant velocity the creep tests proceed in a variable relation between the slip and the diffuse deformation; tests made at a constant stress proceed in a constant relation between the slip and the diffuse deformation.

8869 The Stability of Mechanical Properties of Beta-Phase Magnesium-Lithium Alloys. W. R. D. Jones and G. V. Hogg. *Institute of Metals, Journal*, v. 85, Feb. 1957, p. 255-261 + 3 plates.

Lowering electron concentration by suitable additions, or by increasing the Li content, decreased instability. Silver proved to be the most effective addition. Raising the electron concentration by the addition of Sb increased the instability.

8870 Mechanical Properties of Flake Graphite Cast Irons. G. N. J. Gilbert. *Iron & Steel*, v. 30, Mar. 1957, p. 103-106.

Using the concept of degree of eutectic saturation or the carbon equivalent value, relationship between chemical composition, and strength and hardness is illustrated.

8871* (Japanese.) **Hydrogen Embrittlement and Internal Friction of Carbon Steel.** Genjirō Mima and Michio Mizuta. *Iron & Steel Institute of Japan, Journal*, v. 43, Feb. 1957, p. 132-137.

8872 A Theoretical Criterion for the Fracture of Metals Under Combined Alternating Stresses. Takeo Yokobori. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 77-80.

Present concepts of dislocations are modified by taking into account the stress concentration by the inclusion itself against which dislocations pile up.

8873 Thermionic Constants and Sorption Properties of Hafnium. Homer D. Hagstrum. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 323-328.

8874 Steady-State Creep Through Dislocation Climb. J. Weertman. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 362-364.

A dislocation climb creep model is considered which does not require the production of immobile dislocations.

8875* (French.) A Study of the Adsorption of Gas on Copper. **Etude de l'adsorption de quelques gaz sur le cuivre.** F. Bloyaert, L. D'or, and J. Mignolet. *Journal de Chimie Physique*, v. 54, Jan. 1957, p. 53-57.

Within the limits of a general study on gas adsorption on metal surfaces, surface potentials of some gas films adsorbed on Cu obtained by evaporation in vacuum were measured.

8876* An Experimental Investigation of the Deformed Zone Associated With Indentation Hardness Impressions. L. E. Samuels and T. O. Mulhearn. *Journal of the Mechanics and Physics of Solids*, v. 5, Mar. 1957, p. 125-134.

Tests with 70:30 brass suggest that indentation by the standard pyramidal indenter occurs by a compression type of mechanism rather than a cutting type.

8877 Improving Hot-Ductility of 310 Stainless. R. A. Perkins and W. O. Binder. *Journal of Metals*, v. 9, Feb. 1957, p. 239-245.

Effects of additions of deoxidizing elements such as Si, Mn, V, Al, Ti, Zr, Ce, and Ca.

8878 Heat Treatment Restores Ductility to Forged Titanium Alloys. D. N. Williams and R. I. Jaffee. *Journal of Metals*, v. 9, Feb. 1957, p. 254-260.

Heat-treatment studies of forged compressor wheels were carried out to determine whether wheels rejected due to low ductility could be salvaged by heat treatment. Adequate improvement in ductility was developed by annealing at about 100 F below the β transus, cooling at a low rate to the stabilizing temperature (1200 F), and stabilizing for a short time. The accompanying decrease in strength was slight.

8879 Relative Dimensional Stabilities of a Selected Series of Stainless-Steel Decimeter Bars. Benjamin L. Page. *Journal of Research, National Bureau of Standards*, v. 58, Mar. 1957, p. 119-124.

The average annual change in length of 8 dm. bars of quenched and tempered AISI 420 stainless steel was -0.1μ per m. during a period of 25 yrs.

8880 Hot Work Steels for Aircraft Structures. Edward A. Loria. *Materials & Methods*, v. 45, Mar. 1957, p. 115-119.

Short time stability and creep properties of some promising steels. Recommended heat treatments.

8881* Neutron Radiation Effects on Tensile and Impact Properties of ASTM-A302 B Steel. E. E. Baldwin. *Mechanical Engineering*, v. 79, Mar. 1957, p. 261-265.

Irradiation of normalized and tempered specimens to fast-neutron radiation at 500 and 700 F produced slight increases in tensile and 0.2% offset-yield strength and in charpy V-notch

transition temperatures, and slight decrease in percent elongation and reduction of area. Tests at the higher temperature resulted in some annealing of the embrittling effects of irradiation. Increased damage is predicted with increased irradiation, but the amount of damage will be inversely dependent upon the temperature.

8882 Cracking Tendency in Heavy High-Temperature Steam Piping. Henry M. Soldan and Charles R. Mayne. *Metal Progress*, v. 71, Mar. 1957, p. 78-85.

Stabilized 18-8 (Type 347) is the conventional material for high-temperature steam service. Occasional cracks alongside welds may be avoided by using metal and welding electrodes (like 16-8-2 Cr-Ni-Mo) which have 60% reduction of area or more when cooled from 2400 F and tested at 2300 F.

8883 Fatigue Properties of Brasses, Bronzes and Bearing Metals. J. W. Cuthbertson. *Metal Treatment and Drop Forging*, v. 24, Mar. 1957, p. 89-92.

Service requirements of bearing alloys and the mechanism by which bearings fail through fatigue. Fatigue characteristics of various alloys. (To be continued.)

8884* (French.) Statistical Analysis and Fatigue Data From Testing Aeronautical Materials. **Surles méthodes d'analyse statistique des résultats des essais de fatigue effectués sur des matériaux de l'aéronautique.** F. Gatto. *Métaux, Corrosion-Industries*, v. 32, Jan. 1957, p. 18-37.

Applications and characteristics of statistical methods used in studying fatigue data. A variant of the "Staircase" methods and two new rapid procedures are offered for data classification and determination of the frequency curve.

8885 A Device for Tensile Tests of Irradiated Metals. R. E. Hueschen and D. C. Kaulitz. *Nucleonics*, v. 15, Mar. 1957, p. 88 + 3 pages.

Device can measure elongations up to 50% with a 1-in. long sample at temperatures up to 800 C.

8886 (English.) **Influence of Lattice Defects on the Electrical Properties of Cold-Worked Metals. I.** H. G. van Bueren. *Philips Research Reports*, v. 12, Feb. 1957, p. 1-45.

A critical analysis of literature concerning the principal physical properties of lattice defects in metals, particularly Cu and Au. (To be continued.)

8887 The Existence of Microcracks After Cold-Work. A. N. Stroh. *Philosophical Magazine*, v. 2, ser. 8, Jan. 1957, p. 1-4.

It is suggested that changes in density and electrical resistance on cold-work may be due to the formation of microcracks.

8888 On the Mechanism of Work Hardening in Face-Centred Cubic Metals, With Special Reference to Polycrystalline Copper. P. Feltham and J. D. Meakin. *Philosophical Magazine*, v. 2, ser. 8, Jan. 1957, p. 105-112.

The initial rate of work hardening was linear up to strains of about 1.5%, and independent of the magnitude of the yield stress. At higher strains parabolic hardening occurred.

8889 (English.) **The Thermal Conductance of Contacts Between Aluminium and Other Metals.** F. Boeschoten and E. F. M. Van der Held. *Physica*, v. 23, Jan. 1957, p. 37-44.

Heat transfer in joints between Al and Al, steel, and U, respectively, was measured at 150 C.

8890 (English.) **Measurements on the Magnetic Susceptibility of White Tin and Copper Down to Liquid Helium Temperatures.** A. Van Itterbeek and W. Duchateau. *Physica*, v. 23, Feb. 1957, p. 169-172.

The susceptibility constant for Cu shows a break at 20 K. For polycrystalline tin a decrease of 16% is found between room temperature and 2 K.

8891 Transport Properties of Dilute Binary Magnesium Alloys. Edward I. Salkovitz, Albert I. Schindler, and Erwin W. Kammer. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 887-896.

Evaluation of measurements of resistivity, Hall coefficients, and thermoelectric power.

8892 Why Low Hydrogen Contents Are Desirable in Steel. E. R. Slaughter. Paper from "Proceedings of the Thirty-Ninth Conference, National Open Hearth Committee of the Iron and Steel Division, A.I.M.E.". American Institute of Mining, Metallurgical, and Petroleum Engineers. p. 114-117. (TS1 Am35o Vis.)

Hydrogen may cause several types of defects in steel and is never beneficial. It is unique among alloying elements in that it reduces ductility without any increase in strength. The tendency for the formation of hydrogen-caused defects is greater in alloy steels than in carbon steels.

8893 (German.) Scattering During Long-Time Creep Testing. **Die Streuungen im Zeitstandversuch.** W. Stauffer and A. Keller. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, Feb. 1957, p. 43-52.

The plotting of all values of creep- and time-rupture tests carried out with a material with a view to obtaining average and especially minimum values proved much more suitable than the evaluation of each melt as illustrated by comparison of the figures obtained from American tests.

8894 (German.) Indentation Hardness of Diamond. **Die Eindringhärte von Diamant.** P. Grodzinski. *Schweizer Archiv für Angewandte Wissenschaft und Technik*, v. 23, Feb. 1957, p. 52-56.

Maximum stress as determined by the Hertzian formulas gives comparable values, and a common denominator is established which is composed of a form- and load-factor.

8895* (English.) **Improvement of Copper Alloy Springs. III. Secular Change in Spring Materials of Brass Series.** Osamu Izumi and Masayuki Kawasaki. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, Feb. 1957, p. 32-40.

It is possible to suppress the change if low-temperature annealing is preceded by a 200-day period of stabilization at room temperature. The stabilization time can be less at higher temperatures.

8896 (German.) Statistical Comparison of Notch Toughness Values as Measured on Two Different Pendulum Impact Testing Machines. **Statistischer Verleich der an zwei verschiedenen Pendelschlagwerken gemessenen Kerbschlagzähigkeitswerte.** Alexander Schepers and Franz Rudolf Licht. *Stahl und Eisen*, v. 77, Feb. 21, 1957, p. 218-221.

Comparison of results on DVM-test bars cut from normalized plain C steels, type C-15 with 0.15% C and C-60 with 0.62% C, on two different pendulum impact testing machines.

8897 Evaluation of the Use of Electrical Resistance for Detecting Overtemperatured S-816 Turbine Blades. Leonard Robins. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E57A29a, Mar. 1957, 22 p. (TL782 Un3rm Vis.)

The resistance changes caused by overtemperature were within the scatter band of the resistances of new turbine blades and were less than the maximum variation due to dimensional tolerances. As a consequence, overtemperature is impossible to detect without a knowledge of the blade resistance history.

8898 Effect of Plastic Fatigue on Pressure-Vessel Materials and Design. L. F. Kooistra. *Welding Journal*, v. 36, Mar. 1957, p. 120s-130s.

Establishes the parameters with respect to the plastic fatigue characteristics of pressure-vessel materials.

8899 Ductility Related to Service Performance of Heavy-Wall Austenitic Pipe Welds. Henry M. Soldan and Charles R. Mayne. *Welding Journal*, v. 36, Mar. 1957, p. 141s-150s.

Role which ductility plays in the fabrication and service performance of welds.

8900 Effects of Cold Work and Annealing Temperatures on the Grain Size and Hardness of Various Types of Copper Wire. C. H. Hannon. *Wire and Wire Products*, v. 32, Mar. 1957, p. 293 + 5 pages.

8901 Relaxation Behavior of Titanium Alloys. Franklin J. Gillig. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 55-458, pt. 2, Dec. 1956, 79 p. (TL507 Un3.18w Vis.)

Unit provides practically continuous control of the total strain by automatically decreasing the load as the specimen tends to elongate. Tests were made on three Ti compositions: A-70, C-130AM, and A-110AT.

8902 The Effect of Microstructural Variables and Interstitial Elements on the Fatigue Behavior of Titanium and Commercial Titanium Alloys. Charles B. Dittmar, G. William Bauer, and Dillon Evers. *Wright Air Development Center, Materials Laboratory, WADC Technical Report* 56-304, Jan. 1957, 83 p. (TL507 Un3.18w Vis.)

Microstructure was found to have little effect on the endurance limit of Ti-5Al-2.5Sn, Ti-6Al-4V, and Ti-3Mn unless the structure was extremely coarsened or embrittled.

8903 Mechanical Properties of Unalloyed Chromium. Sheldon A. Spachner and William Rostoker. *Wright Air Development Center, WADC Technical Report* 56-374, pt. 1, Dec. 1956, 66 p. (TL507 Un3.18w Vis.)

Purification of Cr; melting, forging, and machining; mechanical testing; relation of torsion data to tensile data; plastic flow theory; a mechanical effective stress computer.

8904* (Russian.) A Method of Measuring the Relative Magnetic Viscosity of Highly Coercive Alloys. **K metodike izmereniia otnositel'noi magnitnoi viazkosti vysokokoertsitivnykh splavov.** B. V. Getling. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 42-48.

Discussion of magnetic viscosity and problems of measuring it; a ballistic-electronic apparatus for making metallographic tests.

8905* (Russian.) A Means of Determining the Mechanical Characteristics of a Metal Specimen Under Torsional Stress. **Sposob opredeleniia mekhanicheskikh kharakteristik metalla obraztsa pri kruchenii.** N. G. Mikhailichenko. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 83-87.

Determination of the basic mechanical characteristics of a test specimen by automatic recording of the torsion curve.

8906* (Russian.) Electrical Properties of the Intermetallic Compound CdSb. **Elektricheskie svoistva intemetallicheskogo soedineniia CdSb.** I. M. Pilat. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 119-122 + 1 plate.

Cadmium and Sb were eliminated from specimens of CdSb; there resulted very pure CdSb with less than 0.0001% impurities. The electric, rectifying, and thermionic properties were studied.

8907* (Russian.) Galvanomagnetic Properties of Tellurium at Low Temperatures. **Galvanomagnitnye svoistva tellura pri nizkikh temperaturakh.** S. S. Shalyt. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 189-204.

The electroconductivity and galvanomagnetic effects of single crystal and macrocrystal specimens of the semiconductor Te at various degrees of purity, was studied between 400 and 1.3 K.

See also: **8296** (effects of coatings on creep); **8430** (absorption of electromagnetic radiation); **8647** (fatigue of metals during contact friction); **8655** (seizing of stainless steel); **8753** (internal friction measurement); **8789** (properties of rolled steel); **8800** (hydrogen embrittlement of steel); **8832** (hardening cast iron); **8910** (magnetic properties of transformer sheet); **8933** (residual machining stresses); **8990** (creep of brass); **8996** (measurement of magnetic properties); **8997** (properties of intermetallic alloys of Pt and Au); **8998** (tensile strength of sintered steel); **9000** (magnetic properties of Co-Fe powder compacts); **9180** (thermodynamic analysis); **9204** (refractive index of Si and Ge); **9355** (strength of welded joints); **9372** (properties of pressure vessel steels).

METALS—MECHANICAL WORKING

8908* (German.) Special Machine for the Milling of Light Metal Bars. **Sondermaschine zum Fräsen von Leichtmetallbarren.** A. Pfeifer. *Aluminium*, v. 33, Mar. 1957, p. 164-170.

Milling required for the detection of cracks which may be present in rolled bars is rationalized by a new machine, which is almost automatic.

8909* Control Problems in Cold Strip-Rolling Mills. E. Andres. *Brown Boveri Review*, v. 43, Nov. 1956, p. 495-506.

Problems associated with roll drives and pay-off and winding-reel motors.

8910 Effect of Critical Cold Reductions on the Structure and Magnetic Properties of Hot-Rolled Transformer Sheet. B. F. Trakhtenberg. *Henry Brutcher Translation No.* 3838, 12 p. (Abridged from *Stal'*, v. 16, no. 4, 1956, p. 343-347.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 9869, v. 5, Aug. 1956.

8911 An Electronic Measuring System for a Jig Borer. C. R. Borley. *Electronic Engineering*, v. 29, Mar. 1957, p. 128-131.

System is designed to ease the setting of the machine table, to reduce setting errors, and to improve the repeatability of setting accuracy.

8912* (Polish.) Damage to Forging Dies During Forging. **Uszkodzenia matryc podczas kucia.** Wiesław Wróblewski. *Hutnik*, v. 23, Dec. 1956, p. 447-450.

Problems of die life; damage to dies; hardness changes due to temperature; changes in shape; other kinds of damage.

8913 Why Leaded Forgings Favor Machinists. *Iron Age*, v. 179, Mar. 14, 1957, p. 138-139.

Machining tests run on four rings of 1075 grade steel—two leaded by a new process, two unleaded—showed the leaded product machined 31 to 58% faster. Comparisons run on 4140 gear blanks supported findings.

8914 Modern Swaging Packs Surprises as a Production Technique. E. J. Egan, Jr. *Iron Age*, v. 179, Mar. 28, 1957, p. 111-114.

Rotary swaging machines transform non-ductile, crystalline Al-Pb alloys into putty-like material suitable for cold working. It can transfer outside contours to the inside of relatively thick-walled tubing.

8915 Rolling With the Hot Planetary Mill. H. M. Walter. *Iron & Steel*, v. 30, Mar. 1957, p. 95-100.

Experiments with colored Plasticine in a full-scale mill model show that dominating factor is the influence of the feeding speed, although this factor can be reinforced or counteracted by other factors.

8916 New Rod Mill at Bethlehem's Johnstown Plant. J. C. Seibert. *Iron and Steel Engineer*, v. 34, Mar. 1957, p. 71-77.

Plant layout, equipment, and operation. Air and water are used for cooling. Scale loss and acid consumption are reduced. Surface of drawn wire is improved.

8917* (English.) **Research on the Cutting Performance of Fine-Grain Abrasive Stone.** Tokio Sasaki and Kenjiro Okamura. *Kyoto University, Memoirs of the Faculty of Engineering*, v. 18, Oct. 1956, p. 354-366.

Of the constitutional factors, porosity has the most influence on cutting performance.

8918 How Are Your Carbide Tools Performing? II. *Machinery*, v. 63, Mar. 1957, p. 195-202.

Effect of tool shape, speed, feed, depth of cut, and coolant on the life of carbide tools.

8919 Ceramic Tools for Single-Point Turning. A. B. Albrecht. *Machinery*, v. 63, Apr. 1957, p. 149-155.

Oxides tools can cut costs and improve production rates in turning parts to close tolerances at top speeds. Machine tools having ample horsepower, high speeds, and extreme accuracy are requirements for efficient use.

8920 Hot Forged Parts. John L. Everhart. *Materials & Methods*, v. 45, Mar. 1957, p. 135-154.

Design and production of open and closed die forgings. Materials and standard tolerances.

8921 Forging Furnaces in Sweden. A. Roslund and E. Tholander. *Metal Treatment and Drop Forging*, v. 24, Feb. 1957, p. 47-53.

Oil and electric furnaces in relation to the fuel supply situation in Sweden. Relative costs.

8922* The Phenomenon of Cutting. O. Kienzle. *Microtecnic (English Ed.)*, v. 10, no. 6, 1956, p. 253-256.

Phenomena associated with shearing sheet metal by means of a punch and die. Factors influencing quality of cut surfaces; burr formation; wear of cutting tools.

8923* **Ultrasonic Grinding.** Milton C. Shaw. *Microtecnic (English Ed.)*, v. 10, no. 6, 1956, p. 257-265.

In this process a tool is given a H.F., low amplitude oscillation along its axis which in turn transmits a high velocity to fine abrasive particles that are present between the tool and the workpiece. These particles cause small pieces to be chipped from the bottom of the hole as they strike the workpiece and are broug'ıt to rest. Shape of the holes corresponds closely to tool shape. The apparatus largely consists of an electronic oscillator with amplifier and means for adjusting the frequency of oscillation over a small range, the transducer, a connecting cone or tool holder, the tool, a machine base and feeding means, and a fluid system for circulating the abrasive slurry. Average performance with 12 different materials is given. The principal is very effective on brittle materials that are relatively weak in tension, and is useful in certain engraving operations, salvage work, grinding chip breakers in carbide turning tools, and dental preparation of cavities in teeth. Rate of grinding should vary directly with size of the abrasive particle, with frequency to the first power, with amplitude to the ⅔ power, and inversely with strength of the work materials to the ¾ power.

8924* **Study of the Influence of the Addition of Sulphur on the Machinability of a Medium-Carbon Steel.** Paul Bastien and Michel Weisz. *Microtecnic (English Ed.)*, v. 10, no. 6, 1956, p. 273-281.

Influence of sulfur on mechanical characteristics, coefficient of friction, cutting temperature, and shearing stresses. (To be continued.)

8925* **Spinning Aluminum. II.** J. W. Lengbridge. *Modern Metals*, v. 13, Mar. 1957, p. 40 + 3 pages.

Automatic spinning; effect of shapes, speeds, and lubricants.

8926 **Production of Aluminium Tubing Using Automatic Welding.** *Sheet Metal Industries*, v. 34, Mar. 1957, p. 173-175.

8927 **The Assessment of the Drawing and Forming Qualities of Sheet Metal by the Swift Cup-Forming Test.** O. H. Kemmis. *Sheet Metal Industries*, v. 34, Mar. 1957, p. 203-208.

A review compiled for the Swift Cup-forming Test Subcommittee of B.I.S.R.A. tells of objectives of the tests and recommended procedure. (To be concluded.)

8928 **Forming Titanium and Titanium-Alloy Sheet by Stretching and Other Methods.** Ralph A. Kiehl. *Sheet Metal Industries*, v. 34, Mar. 1957, p. 215-223.

Forming data, preforming preparation, and rubber forming operations. (To be concluded.)

8929 **Better Forgings—Proper Testing is Essential for Improved Products.** Ihor E. Suchoversky. *Steel Processing and Conversion*, v. 43, Mar. 1957, p. 127-134.

Directionality of mechanical properties. Basic methods of testing forgings including property level and location testing.

8930 **Metal-Cutting Evaluation.** F. J. Daasch. *Steel Processing and Conversion*, v. 43, Mar. 1957, p. 136-141.

Current status of various techniques. All are based on one or more of four factors: tool life, tool forces, surface quality of finished work, and power consumed.

8931* (Czech.) Machining Rounded Surfaces of Large Articles. **Obráběni kulových ploch u součástí větších rozměrů.** V. Blaheta. *Strojirenska Vyroba*, v. 4, Dec. 1956, p. 519-521.

Various methods and attachments for machining round, concave, and convex surfaces using commonly available tools and equipment.

8932* (English.) **An Analytical Study on Grinding Resistance.** Kenji Sato. *Technology Reports, Tôhoku University*, v. 21, no. 1, 1956, p. 147-177.

Magnitude and direction of force acting on a single grain; scratch test by single grain; formula for grinding resistance; measuring devices; experimental data.

8933* **Hidden Troublemakers—Residual Machining Stresses.** Erik K. Henriksen. *Tool Engineer*, v. 38, Apr. 1957, p. 92-96.

Stresses cannot always be prevented, but an understanding of how they are formed can lead to reducing their effects.

8934* **Tests Compare Finishes From Ceramic and Carbide Tools.** M. C. Shaw and P. A. Smith. *Tool Engineer*, v. 38, Apr. 1957, p. 97-102.

Surface finishes at high cutting speeds.

8935* (Russian.) Rolling and Thermal Treatment of Titanium. **Prokatka i termicheskaia obrabotka titana.** N. P. Zhetvin and V. K. Belosevich. *Tsvetnye Metally*, v. 30, Jan. 1957, p. 72-81.

Experimental study of Ti-Al alloys. Suggestion for most effective and economical methods.

8936* (German.) Development of Deep-Drawn Steel. **Die Entwicklung eines Tiefzieh-Stahls.** Karl Daeves. *VDI Zeitschrift*, v. 99, Mar. 1957, p. 293-295.

Comparative study of Thomas and open hearth steels, including P and N contents, aging, and deep-drawing abilities.

8937 **Fundamental Concepts of Oxygen Cutting.** R. L. Stoecker and W. B. Moen. *Welding Journal*, v. 36, Mar. 1957, p. 151s-156s.

Chemistry and kinetics of the reaction, gas dynamics of the oxygen stream, and various heat transfer mechanisms interdependently control metal removal by an oxygen jet.

8938* **Principles and Applications of Spark Machining. I.** D. W. Rudorff. *Wire Industry*, v. 24, Mar. 1957, p. 251 + 3 pages.

Historical survey; basic principles; elementary circuits; function of the bathing fluid. (To be continued.)

See also: **8319** (patenting of wire); **8331** (jig borer position control); **8887** (effect of cold working on properties); **8970** (structure of rolling mill roll).

METALS—METALLOGRAPHY, TRANSFORMATIONS, AND STRUCTURES

8939 (English.) **Growth of Zinc Whiskers.** R. V. Coleman and G. W. Sears. *Acta Metallurgica*, v. 5, Mar. 1957, p. 131-136.

Whiskers of much greater length were obtained in the presence of a foreign gas than by vacuum deposition. Growth behavior was consistent with, although not necessarily unique to, a proposed model of dendritic growth at screw dislocation sites.

8940 (English.) **The Crystallography of Martensite Transformations. IV. Body-Centred Cubic to Orthorhombic Transformations.** J. K. Mackenzie and J. S. Bowles. *Acta Metallurgica*, v. 5, Mar. 1957, p. 137-149.

Theoretical predictions of habit planes, orientation relationships, and directions of the homogeneous strain are found to agree with the available experimental data for the transformations in Cu_3Al, AuCd, and Ti. Thus the hypothesis that the inhomogeneous shear is a part of a twinning shear in the final structure is substantiated.

8941 (English.) **The Quenching-In of Lattice Defects in Gold-Cadmium.** M. S. Wechsler. *Acta Metallurgica*, v. 5, Mar. 1957, p. 150-158.

Isothermal annealing of the quenched-in resistivity was studied at a number of temperatures. The process appears to have an incubation period and an activation energy for motion of 0.58 e.v. The quenching-in of lattice vacancies is considered the most likely source of the effect.

8942 (French.) An Investigation by Means of Electronic Microdiffraction and Microscopy of the Transformation of the Alloys of Al-Cu by Heat in a Vacuum. **Étude par microdiffraction et microscopie électroniques de la transformation des alliages Al-Cu due au chauffage dans le vide.** N. Takahashi and K. Mihama. *Acta Metallurgica*, v. 5, Mar. 1957, p. 159-168.

In the 50/50 wt.% Cu-Al alloy, the transformation $CuAl_2 \rightarrow CuAl \rightarrow Cu_9Al_4 \rightarrow Cu_3Al_2$ was confirmed by microdiffraction. Relative crystallographic orientation between each phase permitted a mechanism for these transformations to be proposed.

8943 (English.) **Nucleation on Dislocations.** John W. Cahn. *Acta Metallurgica*, v. 5, Mar. 1957, p. 169-172.

The activation energy of nucleation of a second phase on a dislocation is calculated, assuming an elastic model of a dislocation and an incoherent precipitate. The nucleation energy decreases even more rapidly with increasing thermodynamic driving force, than does the nucleation energy for homogeneous nucleation, becoming zero at a finite value of the supersaturation.

8944 Tabulation, Bibliography, and Structure of Binary Intermetallic Compounds. II. Compounds of Beryllium, Magnesium, and Calcium. K. A. Gschneidner, D. J. Beerntsen, R. W. Vest, J. A. Kingston, and J. F. Smith. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-812, Dec. 1956, 36 p. (UF767 Un3.1is Contin.)

8945* (German.) The Secondary Growth of Primary Acicular Martensite in a Steel With 2% C and 5% Cr. **Das sekundäre Wachstum von primär entstandenen Martensitnadeln in einem Stahl mit 2% C and 5% Cr.** Roland Mitsche. *Archiv für das Eisenhüttenwesen*, v. 28, Jan. 1957, p. 53-55.

Observations with the phase contrast microscope.

8946* (English.) **Resistometric and Calorimetric Studies on Precipitation in Aluminium-Silver Alloys.** G. Borelius and L. E. Larsson. *Arkiv för Fysik*, v. 11, no. 2, 1956, p. 137-163.

Phenomena over a range of concentration from pure Al to about 40 at.% Ag.

8947 (Russian.) Investigation of the System Zirconium-Tantalum. **Issledovanie sistemy tsirkonii-tantal.** V. S. Emel'ianov, Iu. G. Godin, and A. I. Evstiukhin. *Atomnaia Energiia*, v. 2, Jan. 1957, p. 42-47 + 2 plates.

Develops constitution diagram of the system. Solubility of Ta in α-Zr at 790 C is less than 0.22 at.%; in β-Zr at 1585 C it is 16 at.%. Eutectic at 1585 C is 34 at.% of Ta.

8948 An Extraction Replica Method for Large Precipitates and Non-Metallic Inclusions in Steels. G. R. Booker and J. Norbury. *British Journal of Applied Physics*, v. 8, Mar. 1957, p. 109-113.

Method allows extraction of precipitates up to 10μ. There is no etching through the replica, and consequently weakening and staining of the film are avoided. Included material normally dissolved by bulk extraction methods has been successfully extracted.

8949 Rate of Diffusion of Boron in Iron-Base Alloys. M. E. Blanter and N. P. Besedin. *Henry Brutcher Translation No.* 3736, 9 p. (Abridged from *Metallovedenie i Obrabotka Metallov*, v. 1, no. 6, 1955, p. 3-9.)

Previously abstracted from original. See item 4326, v. 5, May 1956.

8950 Role of Grain Boundary Substance in the Hot Cracking of (Austenitic) Welds. V. A. Toropov. *Henry Brutcher Translation No.* 3809, 11 p. (From *Metallovedenie i Obrabotka Metallov*, v. 2, no. 4, 1956, p. 45-58.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 11522, v. 5, Sept. 1956.

8951 Tough-to-Brittle Transition Temperatures and Aging Characteristics of Titanium-Stabilized Low-Carbon Steels. A. Josefsson and B. Nelson. *Henry Brutcher Translation No.* 3846, 19 p. (From *Jernkontorets Annaler*, v. 137, no. 10, 1953, p. 725-743.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 5359, v. 3, April 1954.

8952* (French.) An Isothermal Phase Change of Titanium at High Temperature. **Observation d'un changement de phase isotherme du titane à haute température.** Micheline Sorel-Sternberg. *Comptes Rendus*, v. 244, Feb. 4, 1957, p. 765-767.

The crystal growth in Ti was cinematographically recorded with an emission electron microscope and a change of the isothermal phase at high temperature of this metal was studied.

8953* (French.) Distribution of Hydrogen in the α-Iron Lattice. **Localisation de l'hydrogène dans le réseau du fer α.** Jacques Plusquellec, Pierre Azou, and Paul Bastien. *Comptes Rendus*, v. 244, Feb. 25, 1957, p. 1195-1197.

X-ray diffraction shows that H collects preferably in defects of the α-iron lattice. Various phenomena can be explained in turns of this distribution of H.

8954* (French.) Effect of Thermal Treatment in the γ-Phase on the Appearance of Substructures in α-Uranium. **Influence de traitements thermiques en phase γ sur l'apparition de sous-structures dans l'uranium α.** Paul Lacombe, André Robillard, and Daniel Calais. *Comptes Rendus*, v. 244, Mar. 4, 1957, p. 1367-1370.

Annealing in the γ phase followed by quenching at a speed depending on the annealing temperature causes substructures different from those due to the α-uranium polygonization. Nature of these substructures.

8955* Microscopical Examination of Metallic Surfaces. J. Nutting. *Discovery*, v. 18, Mar. 1957, p. 112-117.

Relation of microstructure to mechanical properties. Preparation of metal for examination. The polygonal network of a metal. Primary and secondary phases. Carbon replicas.

8956 Supercooling, Preferred Orientation, and Inverse Segregation in Lead-Antimony Alloys. A. C. Simon and E. L. Jones. *Electrochemical Society, Journal*, v. 104, Mar. 1957, p. 133-140.

Supercooling of Sb at eutectic temperatures and a preferred orientation and growth direction for the Sb crystals are responsible for the excessively large coverage by Sb in the surface of the cast alloy. Preferred orientation with the [111] direction perpendicular to the surface and preferred directions of growth parallel to the (111) plane are caused by the strong covalent linkages within the (111) pairs of planes.

8957 Low-Pressure Solubility and Diffusion of Hydrogen in Zirconium. M. W. Mallett and W. M. Albrecht. *Electrochemical Society, Journal*, v. 104, Mar. 1957, p. 142-146.

Low-pressure solubilities were determined for H in α- and β-Zr and in two Zr-O alloys at 700-1000 C and pressures of 0.1-4μ Hg. The data followed Sieverts' law for each phase, and H solubility decreased with increasing temperature at a given pressure. The experimental energy of activation for diffusion in the range 305-610 C is 7060 ± 260 cal. per mole, and the diffusion coefficient in sq. cm. per sec. is 7.00×10^{-4} exp $-7060/RT$.

8958* (Russian.) The Order-Disorder Mechanisms in the Alloy Ni_3Mn With Various Additions of Molybdenum. **O mekhanizme uporiadocheniia splava Ni_3Mn s razlichnymi prisadkami molibdena.** V. G. Lifshits, B. V. Molotilov, N. N. Miuller, and N. A. Savost'ianova. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 477-482.

The order-disorder process in the binary alloy Ni_3Mn, and a ternary Ni-Mn-Mo alloy takes place as a phase transformation.

8959* (Russian.) The Order-Disorder Process in Iron-Cobalt Alloys. **O protsesse uporiadocheniia v zhelezokobal'tovykh splavakh.** G. N. Kadykova and Ia. P. Selisskii. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 486-496.

Data on the kinetics of the order-disorder process in binary Fe-Co alloys and Fe-Co alloys with added Cr and V. Observed hardening and an anomalous change in electrical resistance during annealing.

8960* (Russian.) X-Ray Determination of the Dimensions of Block Structure in Cast, Single Crystals of Aluminum. **Rentgenograficheskoe opredelenie razmerov blokov v litykh monokristallakh aliuminiia.** D. E. Ovsienko and E. I. Sosnina. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 516-526.

X-ray measurements of blocks 10^{-4}-10^{-2} cm. in size, having both primary and secondary extinction. Shows that as rate of growth increases, the size of the blocks decreases.

8961* (French.) The Structure of New and Used Ingot Molds Obtained From Several Steel Plants. **Structure des lingotières d'aciéries neuves et après utilisation.** Michel Ferry. *Fonderie*, no. 133, Feb. 1957, p. 55-63.

Twenty new and ten old ingot molds were examined for the variation in their structure caused by repeated heating.

8962* (French.) A Contribution to the Study of the Macrographic and Micrographic Structures of Gray Cast Iron Used in Making Ingot Molds. **Contribution a l'étude des structures macrographiques et micrographiques de la fonte grise pour**

lingotières d'aciéries. L. Beaujard and S. Béchet. *Fonderie*, no. 133, Feb. 1957, p. 80-89.

Various tests showed that the distribution of sulfides (Fe-Mn)S is a function of the casting temperature. Above 1,200 to 1,220 C the dendritic aspect of this distribution increases with higher temperature. The surface structure is a function of temperature of the casting and mass of the specimen.

8963 Origin of Graphite in Cast Irons. I-II. J. E. Harris and V. Kondic. *Foundry Trade Journal*, v. 102, Feb. 28, 1957, p. 267-277; Mar. 7, 1957, p. 311-314.

Effects of treatment, composition, and cooling rates upon the shape, size, and distribution of graphite flakes. Formation of the graphite phase through decomposition of Fe_3C is proposed.

8964* (Czech.) Non-Metallic Inclusions in Steel. **Nekovové vměstky v oceli.** Jiří Skála and Dagmar Tlustá. *Hutník*, v. 7, Feb. 1957, p. 42-47.

Origin and causes; effects of burdening and pouring; character and distribution; effects on mechanical properties; identification and classification of inclusions.

8965 The Equilibrium Diagram of the System Copper-Sulphur. J. Nutting. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 24, Oct. 1956, 5 p. (QD501 17an Contin.)

Includes tabulated numerical data and notes.

8966 The Equilibrium Diagram of the System Chromium-Iron. A. Hellawell. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 25, Oct. 1956, 5 p. (QD501 17an Contin.)

A composite diagram with tabulated numerical data and pertinent notes.

8967 The Equilibrium Diagram of the System Iron-Manganese. A. Hellawell. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 26, Oct. 1956, 5 p. (QD501 17an Contin.)

The most probable composite diagram, with numerical data and pertinent notes.

8968 The Equilibrium Diagram of the System Iron-Vanadium. A. Hellawell. *Institute of Metals, Annotated Equilibrium Diagrams, No.* 27, Oct. 1956, p. 5. (QD501 17an Contin.)

8969* (Japanese.) **Research on the Non-Metallic Inclusions of Killed Steel. III.** Yosaku Koike, Iechika Inuzuka, and Takeo Horigome. *Iron & Steel Institute of Japan, Journal*, v. 43, Feb. 1957, p. 122-126.

Results from experimentally designed 500 kg. ingot molds whose bottoms were lined with refractories were compared with the normal molds by investigation of experimental ingots or forged billets. Aluminum additions in the ladle were 200 to 500 g. per ton.

8970* (Japanese.) **Electron-Microstructure of the Work Roll for Cold Rolling. I.** Takuo Ando, Keiya Gokan, and Kenichi Arase. *Iron & Steel Institute of Japan, Journal*, v. 43, Feb. 1957, p. 127-132.

Electron microscopy of the surface layer of a heat-treated roll showed that it consists of spheroidized carbides, martensite matrix, and some amount of retained austenite. Roll preparation is described.

8971 Carbide Precipitation in Tungsten — Chromium Steels Below 700°C. Kehsin Kuo. *Iron and Steel Institute, Journal*, v. 185, Mar. 1957, p. 297-303.

X-ray and chemical analyses were carried out on carbides extracted electrolytically from steels containing up to 15% W and 12% Cr. There is no new carbide in the quaternary system Fe-W-Cr-C, and all carbides present in W-Cr steels are derived from the respective carbides in W and Cr steels; M_2C and $M_{23}C_6$ have extended solubility ranges for both W and Cr, M_7C_3 contains mainly Cr in addition to Fe and M_6C mainly W. Chromium delays formation of MC, while W causes the appearance of $M_{23}C_6$, which absorbs a substantial amount of Cr, thus reducing the possibility of the existence of M_7C_3 at equilibrium. The carbide sequence occurring on tempering is M_3C, M_7C_3, $M_{23}C_6$ in high-Cr and M_3C, M_2C, M_6C, $M_{23}C_6$ in high-W steels.

8972 Variations in the Structure Across the Thickness of the Scale on Nickel Steels. K. Sachs. *Iron and Steel Institute, Journal*, v. 185, Mar. 1957, p. 348-357.

A tentative diagram shows the phases coexisting at 1200 C at various Ni contents and partial pressures of O.

8973 The Nature of Aging of Binary Iron-Chromium Alloys Around 500°C. R. O. Williams and H. W. Paxton. *Iron and Steel Institute, Journal*, v. 185, Mar. 1957, p. 358-374.

The so-called "475 C embrittlement of ferritic stainless steels" is actually an aging or precipitation hardening phenomenon resulting from the existence of a miscibility gap in the Fe-Cr system at these temperatures. The precipitate may be considered to be body-centred-cubic Cr which contains small amounts of Fe.

8974 Theory of Thermal Grooving. W. W. Mullins. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 333-339.

A theory of development of surface grooves at grain boundaries of a heated crystal was deduced for two cases: first, when the process responsible for the transfer of matter is evaporation-condensation, and second, when it is surface diffusion. In each case the groove profile maintains a distinctive time-independent shape.

8975 Analysis of Elastic and Plastic Strains of a Face-Centred Cubic Crystal. T. H. Lin. *Journal of the Mechanics and Physics of Solids*, v. 5, Mar. 1957, p. 143-149.

8976 Preferred Orientation in Extruded Uranium Rod. L. K. Jetter and C. J. McHargue. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Feb. 1957, p. 291-292.

Deformation texture of U rod extruded at 500 C.

8977 A Variable Structure-Factor Graph for Use in Crystal-Structure Determination. K. A. Morley and C. A. Taylor. *Journal of Scientific Instruments*, v. 34, Feb. 1957, p. 54-58.

Instrument incorporates two tables, linked so that a rotation of one causes an identical rotation of the other. A drawing of proposed atomic positions is placed on one table and lies under a net of parallel wires which represent the contours of a structure-factor graph. Adjusting positions indicates possible improvements in agreement between the diffraction patterns of the proposed and actual structures.

8978 A Summay of X-Ray Studies of Irradiation Effects. C. W. Tucker, Jr. and P. Senio. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1698, Jan. 1957, 18 p. (UF767 Un3.1ka Contin.)

Effects of radiation on lattice structure of various types of crystals.

8979* (German.) Effects of Melting Conditions and Alloying Elements on the Structure of Aluminum Castings. **Beeinflussung des Gussgefüges von Aluminium durch die Schmelzführung und durch Zusätze.** F. Lihl and J. Sagoschen. *Metall*, v. 11, Mar. 1957, p. 179-189.

Effect of adding Fe, Si, Ti, Cu, Mg, Sn, and Zn on structure. Effects of various melting conditions. Selection of proper solidifying conditions.

8980 Grain Growth in Steels. II. Role of Aluminium Nitride. A. B. Chatterjea and B. R. Nijhawan. *Metal Treatment and Drop Forging*, v. 24, Feb. 1957, p. 54-60.

Solution of AlN in austenite, or their agglomeration, depending on Al content, may account for observed grain-growth characteristics.

8981 (Italian.) Polymorphism of Metals and Effects of Alloying Elements. **Polimorfismo dei metalli ed influenza esercitata su di esso dagli elementi di alligazione.** W. Köster. *Metallurgia Italiana*, v. 49, Jan. 1957, p. 14-23.

Identification and kinetics of polymorphism transformation mechanism. Effect of alloying constituents on Fe, Co, and Mn alloys.

8982* (French.) On the Structure of Electrolytically Deposited Tin Coating. **Sur la structure des dépôts d'étain obtenus par voie électrolytique.** J. J. Trillat, S. C. Britton, K. Mihama, and S. Barbezat. *Métaux, Corrosion-Industries*, v. 32, Jan. 1957, p. 1-9.

Studies with the electron microscope and by X-ray diffraction. Effect of wood tar as a brightener on the size and orientations of the grains. Nature of the crystals in matte and bright coatings.

8983 Order-Disorder Phenomena. E. W. Elcock. 166 p. 1956. John Wiley and Sons, New York. (QD911 EL19o)

The nature of ordered structures and of the order-disorder transformation, considering only equilibrium phenomena in binary alloys. Theoretical determination of order parameters as functions of temperature and composition for particular alloy sequences.

8984 Liquid Immiscibility in Metal Systems. B. W. Mott. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 259-283.

The simple Hildebrand rule, which holds for non-polar liquids, can be modified to apply to metal systems, by the introduction of a new term which allows for the increased energy due to a difference in electronegativity of the components. Data is given for numerous alloy systems.

8985* (English.) **Electron Diffraction Study on Polished Layers of Gold. I.** Masao Kuriyama, Kazutake Kohra, and Satio Takagi. *Physical Society of Japan, Journal*, v. 12, Feb. 1957, p. 151-156.

Even at medium states of polishing the specimen can attain a grain size of 80 A and 3.6% strain. Grain size rapidly decreases as polishing proceeds.

8986* The Constitution of Alloys of Iron and Manganese With Transition Elements of the First Long Period. A. Hellawell and W. Hume-Rothery. *Royal Society of London, Philosophical Transactions*, v. 249, ser. A, Mar. 1957, p. 417-459.

Thermal analysis established the forms of the A_4 (γ/δ) transformations in the Fe alloys, and of the (γ/δ) and (γ/β) transformations in the Mn alloys, complete liquidus and solidus for the system Fe-Mn, and equilibrium diagrams of the systems Fe-Ti and Mn-Ti as far as 52 at.% Ti.

8987* (English.) **The Light-Figure Method as Compared With the Back-Reflection Laue Method for Determining Orientations of Metal Single Crystals.** Mikio Yamamoto and Jirô Watanabé. *Science Reports of the Research Institutes, Tôhoku University*, v. 9, ser. A, Feb. 1957, p. 24-31.

The light-figure method can be applied for any metal crystal of any orientation and of a fairly large size with simple apparatus and procedure, orientation determination can always be made with an accuracy as high as, or even higher than, that of the back-reflection Laue method.

8988* (English.) **Change in Laue Diagram of Aluminium Single Crystal by Cold-Working.** Kôichi Nakajima and Takeo Hikage. *Science Reports of the Research Institutes, Tôhoku University*, v. 9, ser. A, Feb. 1957, p. 41-47.

In the early stage of slip deformation the distortion in the crystal takes place according to the geometrical relation of stress; with increasing deformation the lattice bending becomes a controlling factor.

8989* (English.) **Diffusion of Sulfur in Liquid Iron. I. Diffusion in Pure Iron.** Yasuji Kawai. *Science Reports of the Research Institutes, Tôhoku University*, v. 9, ser. A, Feb. 1957, p. 78-83.

The diffusion coefficient can be expressed as $D=4.9 \times 10^{-4}\exp(-4350/T)$. Activation energy is 8600 cal.

8990 Nucleation of Voids in Metals During Diffusion and Creep. R. Resnick and L. Seigle. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission)*, SEP-213, May. 1956, 35 p. (UF767 Un3.1se Contin.)

Voids formed during diffusion in brass are heterogeneously nucleated. The nuclei appear to be oxide particles, probably ZnO. Brass which had been freed of void nucleation catalysts cracking during creep, and increased stress-rupture life.

8991 Survey of Microstructures and Mechanical Properties of Over-Temperatured S-816 Turbine Buckets From J47 Engines. S. Floreen and R. A. Signorelli. *U. S. National Advisory Committee for Aeronautics, Research Memorandum* E56K30, Mar. 1957, 41 p. (TL782 Un3rm Vis.)

8992* (Russian.) The Nature of the Polished Layer at the Friction Surface of Steel. **O prirode svetloi zony v sloe prilegaiushchei k poverkhnosti treniia stali.** N. N. Seleznev, I. E. Brainin, and P. I. Kuleshov. *Vestnik Mashinostroeniia*, v. 37, Mar. 1957, p. 35-39.

Nature of transformations taking place at the surface layer of rubbing steel parts. The polished zone consists of martensite, residual austenite, and alloyed cementite.

8993 Theory of Local Atomic Displacements in Solid Solutions of Uranium Alloys. R. B. Roof, Jr. *Westinghouse Electric Corporation (U.S. Atomic Energy Commission)*, WAPD-TM-22, Dec. 1956, 15 p. (UF767 Un3.1wa Contin.)

The method employed for the determination of local atomic displacements involves the determination of the Debye factor at two different temperatures. The difference between these two values is then used to compute the mean Debye temperature from which the thermal displacements of the atoms are obtained.

8994* (Russian.) Experience in Using Tritium for Studying the Behavior of Hydrogen in Metals. **Opyt primeneniia tritiia dlia izucheniia povedeniia vodoroda v metallakh.** A. I. Chizhikov and V. K. Boiarshinov. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 11-14.

A method for testing solubility of H. Tests were made on Al-Mg-Si-Fe alloy, and steel with the following alloying elements: C, Si, Mn, S, and P. Method could be used for investigating diffusion or isotope exchange.

8995* (Russian.) Using a Capacitor Dilatometer for Investigating Phase Transformations During Rapid Heating. **Primenenie emkostnogo dilatometra dlia issledovaniia fazovykh prevrashchenii pri by strom nagreve.** I. N. Kidin and A. V. Panov. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 48-52.

Apparatus for making tests on materials heated. May be at rates from 1 to 10,000 degrees per sec. The change in length changes the capacity of a special capacitor.

8996* (Russian.) Evaluating the Transformation of Residual Austenite in Spring Steel Strips. **Ob otsenke prevrashchenii ostatochnogo austenita v pruzhinnoi lente.** G. E. Egorov, G. T. Nazarenko, and V. P. Moiseev. *Zavodskaia Laboratoriia*, v. 23, Jan. 1957, p. 52-55.

Investigating the structural changes during heat treatment by measuring changes in magnetic saturation and coercive force.

8997* (Russian.) Intermetallic Alloys of Pt and Au With Alkaline and Alkaline-Earth Metals. **Ob intermetallicheskikh splavakh platiny i zolota so shchelochnymi i shchelochnozemel'nymi metallami.** I. L. Sokol'skaia. *Zhurnal Tekhnicheskoi Fiziki*, v. 27, Jan. 1957, p. 127-129.

Conductivity and other electric properties of systems: Me-Au, Me-Pt (Me=alkali and alkaline-earth metals), and Ba-Pt. Sodium-gold alloy is semiconductive; probably Na-Pt and Ba-Pt are also semiconductors.

See also: **8640** (replica metallographic techniques); **8761** (inclusions in steel); **8854** (X-ray studies of deformation); **8863** (phase diagrams of Ni alloys); **8874** (dislocation climb in creep); **8886** (effects of lattice defects); **8900** (structure of cold-worked Cu); **8902** (microstructure of Ti alloys); **9004** (structure of Ni powder compacts); **9238** (use of plastics in radioactive metallography).

METALS—POWDER

8998 The Tensile Strength of Light Steel. E. W. Williams. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 147-153.

Studies of controlling factors in "controlled density steel" made by direct reduction of iron oxide powders with coke breeze in a sealed sagger at 2000 F.

8999* (Polish.) Production of Nickel Electrolytic Powder From Sulfate and Chloride Solutions. **Produkcja elektrolitycznego proszku niklu z roztworów siarczanów i chlorków.** Marek Brafman, Adam Kanas, and Irena Pajak-Szymeczko. *Kutnik*, v. 23, Nov. 1956, p. 418-426.

Formation of cathodic deposits in powder form. Present methods of preparing Ni powder electrolytically. Description of test apparatus, electrolytes, electrodes, and results.

9000 Reproducing the Properties of Alnico Permanent Magnet Alloys With Elongated Single-Domain Cobalt-Iron Particles. F. E. Luborsky, L. I. Mendelsohn, and T. O. Paine. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 344-351.

By considering the factors of particle geometry, chemical composition, degree of alignment, and packing density, the properties of the Alnico alloys can be synthesized with fine-particle techniques.

9001 High Strength Structural Parts by Powder Metallurgy—Theory. Henry H. Hausner. *Journal of Metals*, v. 9, Mar. 1957, p. 331-333.

Factors responsible for the strength of metals prepared by powder metallurgy and other means.

9002 High Strength Structural Parts by Powder Metallurgy—Applications. J. M. Copeland. *Journal of Metals*, v. 9, Mar. 1957, p. 336-339.

Details of the application of coining and resintering techniques; application of sintering processes.

9003 Dispersed Hard Particle Strengthening of Metals. Nicholas J. Grant and Oliver Preston. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Mar. 1957, p. 349-357.

Description of alloys such as SAP, produced by powder metallurgy, and other sintered Al powders, Mo containing small quantities of refractory oxides, and Mg containing a dispersed intermetallic. Internal oxidation and other methods of achieving a hard particle dispersion. High temperature strength and stability of the alloy systems Cu-Al_2O_3, Ni-Al_2O_3, and Be-Be_2C.

9004 Investigation of the Annealing of Deformed Nickel Powder by X-Ray and Stored Energy Measurements. D. Michell and F. D. Haig. *Philosophical Magazine*, v. 2, ser. 8, Jan. 1957, p. 15-32.

Results indicate two stages in the relief of strain. The first occurs mainly in the less severely deformed regions without increase in the "apparent particle size" and is attributed to recovery. In the second, all the remaining strain is relieved by recrystallization with an increase in the "apparent particle size".

9005 An Investigation of the Slip-Casting Mechanism as Applied to Stainless Steel Powder. W. G. Lidman and R. V. Rubino. *Sylvania Electric Products, Inc. (U. S. Atomic Energy Commission)*, SEP-208, Feb. 1956, p. 4-23.

Specimens were made with properties comparable to those of wrought stainless steel and of cold pressed and sintered steel powder.

9006* Carbides That Are Weldable, Machinable and Heat Treatable. John L. Ellis. *Tool Engineer*, v. 38, Apr. 1957, p. 103-105.

Alloy steels with varying alloy content are infiltrated into the porous titanium carbides compact. The resulting material acquires correspondingly greater hardness, hot-hardness, and wear resistance.

9007 New High Temperature Intermetallic Materials. R. D. Grinthal. *Wright Air Development Center, WADC Technical Report* 53-190, pt. 5, Nov. 1956, 57 p. (TL507 Un3.18w Vis.)

An investigation of the Cu-Mo-Si, Cr-Mo-Si, Ti-Mo-Si, Cr-Ti-Si, Ti-Al-Ni, and Cr-Ti-Cu systems.

See also: **8795** (arc-melting Th compacts); **8944** (intermetallic compounds).

NONDESTRUCTIVE TESTING AND QUALITY CONTROL

9008 The Use of Atomic Energy in the Testing of Materials. W. M. Keller. *American Society of Mechanical Engineers, Paper No.* 56-A-81, 1956, 7 p. (TJ1 Am35p Contin.)

The parameters involved in use of atomic energy in testing materials for railroad equipment. Difficulties include interference with railroad production schedules and the expense and cumbersome means presently employed in developing and analyzing films produced by the γ-ray exposures.

9009 Ultrasonic Measurement of Section Size of Gray-Iron Castings. R. Ziegler and R. Gerstner. *Henry Brutcher Translation No.* 3840, 17 p. (Abridged from *Giesserei, Techn.-Wissensch. Beihefte*, no. 16, Sept. 1956, p. 829-835.) Henry Brutcher, Altadena, Calif.

Correlation between relative sound velocity and degree of saturation, Brinell hardness, and wall thickness; possibility of inverting the correlations to secure information about the properties of a casting.

9010 The Role of Statistical Methods in Controlling the Quality of Non-Ferrous Castings. A. R. Martin. *Institute of Metals, Journal*, v. 85, Feb. 1957, p. 209-226.

9011 The Control of Quality of Magnesium-Base Alloy Castings. E. F. Emley and P. A. Fisher. *Institute of Metals, Journal*, v. 85, Feb. 1957, p. 236-254 + 1 plate.

Practical steps which contribute to high quality in sand castings. Inspection techniques designed to show whether high quality has in fact been achieved. Practical significance of various defects.

9012 New Test Checks Electroplating Porosity. F. Ogburn. *Iron Age*, v. 179, Mar. 7, 1957, p. 123-126.

New radiographic methods permit nondestructive checking of adherent plated coatings for porosity, pits, and other discontinuities.

9013 To Cut Costs: Take a Close Look at Scrap Control. *Iron Age*, v. 179, Mar. 28, 1957, p. 81-88.

Pointers for building a workable system of inspection. Ways of minimizing production of faulty work. Salvage possibilities.

9014 An Investigation of the Structural Conditions in Steel Bearing-Balls. I. Berz, K. F. Hale, and C. Wainwright. *Metallurgia*, v. 55, Mar. 1957, p. 121-124.

Methods for nondestructive physical tests of bearing balls.

9015 Magnetic Testing as an Assist to Production Quality Control. Gerald F. Barta. *Metal Products Manufacturing*, v. 14, Mar. 1957, p. 25 + 5 pages.

Includes basic information on magnetism, reasons for quality control testing, and tests applicable to a wide variety of manufactured products.

9016* Relationship Between Defect Orientation and Ultrasonic Indications. R. E. Kleint. *Nondestructive Testing*, v. 15, Jan.-Feb. 1957, p. 30-34.

Maximum ultrasonic indications exist when the geometric conditions of Snell's law are fulfilled. Defects oriented at angles to the surface are much less likely to be detected when employing high crystal frequencies.

9017* Standardization and Application of Ultrasonic Surface-Wave Inspection. George J. Binczewski. *Nondestructive Testing*, v. 15, Jan.-Feb. 1957, p. 36-40.

Study of surface conditions that influence the propagation of surface waves and the response of the waves as affected by distance, depth, and the edge angles of surface imperfections.

9018* Data Extraction in Nondestructive Testing. Henry N. Staats. *Nondestructive Testing*, v. 15, Jan.-Feb. 1957, p. 44-46.

Use of "FACSI", a combination of microtape and edge-punched cards, in a simple, rapid, low cost extraction technique.

9019* Quality Characteristics of Chemical Equipment and Their Control Through Nondestructive Testing. C. J. Veith. *Nondestructive Testing*, v. 15, Jan.-Feb. 1957, p. 48 + 6 pages.

Quality characteristics include method of manufacture, structural integrity, actual use of specified materials, leak lightness, dimensional tolerances and stability, surface cleanliness, and surface finish.

9020 Inspection of Small Diameter Tubing by Eddy-Current Methods. J. W. Allen and R. B. Oliver. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2253, Mar. 1957, 35 p. (UF767 U3o Contin.)

Elements of eddy-current testing; current methods and their value.

9021 Immersed Ultrasonic Inspection of Pipe and Tubing. R. B. Oliver, R. W. McClung, and J. K. White. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, ORNL-2254, Mar. 1957, 31 p. (UF767 U3o Contin.)

Inspection procedure applies to tubing larger than 3/16-in. OD and for all pipe sizes up to 8-in. Rotational speeds up to 300 r.p.m. and linear scanning speeds up to 12-ft. per min. are employed.

9022* (English.) **Ultrasonic Attenuation in Steel and Cast Iron.** Kazuo Kamigaki. *Science Reports of the Research Institutes, Tôhoku University*, ser. A, v. 9, Feb. 1957, p. 48-77.

Ultrasonic attenuation is closely dependent on structure of the materials. The most predominant factor determining its magnitude is the Rayleigh scattering by grains.

9023 Greater Acceptance of Welding Through the Use of Inspection Methods. John R. Harrer. *Welding Journal*, v. 36, Mar. 1957, p. 252-256.

Need for standards when using magnetic particle inspection on critical weldments.

See also: **8420** (thickness measurement of electrodeposits).

NUCLEAR PHYSICS, NUCLEONICS, AND RADIATION

9024 Description and Operation of Two ORNL Research Reactors—X-10 Graphite Reactor and LITR. J. A. Cox. *American Ceramic Society Bulletin*, v. 36, Mar. 1957, p. 90-94.

One is a graphite moderated, air-cooled, natural U reactor; the second is water-cooled and moderated, and uses enriched U.

9025 Beta Spectroscopy Using a Diffusion Cloud Chamber. Anthony A. Silvidi. *American Journal of Physics*, v. 25, Mar. 1957, p. 159-164.

The β spectrum of Pm^{147} was obtained and compared with the spectrum obtained using an intermediate-image type spectrometer.

9026 Decay Schemes of Cl^{34} and Sc^{47}. R. T. Nichols and E. N. Jensen. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-679, Dec. 1954, 61 p. (UF767 Un3.1is Contin.)

9027* (German.) The Antineutron. **Das Antineutron.** K. H. Lauterjung. *Angewandte Chemie*, v. 69, Mar. 7, 1957, p. 171-172.

Experimental procedures for production and identification.

9028 A General Method for Comparing Thermal Performance of Fuel Element Geometries and Coolants for Non-Boiling Reactors. G. A. Freund and A. L. London. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5589, Jan. 1957, 30 p. (UF767 Un3.1an Contin.)

Illustrative examples are given for water, diphenyl, and carbon dioxide (at 450 psi.) as coolants, and plate-channels (as in MTR), crossed wires, and sphere beds as fuel element geometries.

9029 Design Evaluation of BER (Boiling Experimental Reactor) in Regard to Internal Explosions. F. B. Porzel. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5651, Jan. 1957, 108 p. (UF767 Un3.1an Contin.)

Analysis of safety aspects shows reactor to be reasonably safe for the estimated release of 0.8×10^8 calories. Blast wave in free concrete, shock transfer across interface, protective methods, and blast shield design are covered.

9030 Underground Construction of Power Reactors. D. R. Inglis and G. R. Ringo. *Argonne National Laboratory (U. S. Atomic Energy Commission)*, ANL-5652, Jan. 1957, 6 p. (UF767 Un3.1na Contin.)

Geographical and strategic considerations; cost estimates.

9031* (English.) **The Capture of a Σ^--Hyperon Without Any Visible Interaction.** K. Kristiansson and T. Johansson. *Arkiv för Fysik*, v. 11, no. 3, 1956, p. 277-280.

Event of a σ^--hyperon coming to rest, interacting with a nucleus, and giving a O-prong star.

9032* (English.) **An Investigation on Latent Image Fading in Ilford G-5 Emulsions.** Göran Leide. *Arkiv för Fysik*, v. 11, no. 4, 1957, p. 329-346.

Fading of individual proton tracks was determined as a function of time, temperature, relative humidity, and energy loss.

9033 (Russian.) Nuclear Fission of Heavy Elements by High Energy Particles. **Delenie iader tiazhelykh elementov chastitsami vysokoi energii.** A. K. Lavruzhina and L. D. Krasavina. *Atomnaia Energiia*, v. 2, Jan. 1957, p. 27-35.

Radiochemical study of nuclear fission of Th and Bi by protons with energies of 680 m.e.v.

9034* (Russian.) Some Problems in Operating an Atomic Electric Power Plant. **Nekotorye voprosy ekspluatatsii atomnoi elektrostantsii.** A. N. Grigor'ianits. *Atomnaia Energiia*, v. 2, Feb. 1957, p. 109-117.

Methods of reloading the reactor; starting the plant from no-load to nominal load; cooling equipment; chemical reactions in water and steam; biological dangers.

9035* (German.) Cost of Fission in Atomic Power Reactors. **Spaltstoffkosten in atomkraftwerken.** Dieter Weissbarth. *Atomwirtschaft*, v. 11, Feb. 1957, p. 44-49.

Analysis of investment, material and operating costs of atomic power, based on various types of reactors.

9036 Hazards Summary Report for the Battelle Research Reactor. J. W. Chastain, R. F. Redmond, A. Klickman, J. Anno, and S. L. Fawcett. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI-ACRS-601 (Rev.), Apr. 1955, 63 p. (UF767 U3b Contin.)

Details of the proposed "swimming-pool" reactor, reactor building, instrumentation, shielding, make-up of surrounding area, operating procedures, and potential hazards.

9037 Studies of Mixing in the Lower Plenum of a Quarter-Scale Flow Model of the PWR Reactor. Herbert R. Hazard and Abraham Rotkowitz. *Battelle Memorial Institute (U. S. Atomic Energy Commission)*, BMI 1172, Feb. 1957, 19 p. (UF767 U3b Contin.)

Mixing was studied by use of SO_2 as a gaseous tracer in air entering one inlet. The concentration of SO_2 in each of the 145 simulated fuel clusters was determined under various operating conditions, and from these concentrations the extent of mixing was determined.

9038 Interaction of Enriched Uranium Assemblies. H. F. Henry. *Carbide and Carbon Chemicals Corporation, K-25 Plant (U. S. Atomic Energy Commission)*, AECD-3740, Nov. 1949, 15 p. (UF767 Un3m Contin.)

Average interaction probabilities are determined.

9039 Decontamination of Irradiated Uranium by a Fluoride Volatility Process. William J. Mecham, Robert C. Liimatainen, Robert W. Kessie, and Waldemar B. Seefeldt. *Chemical Engineering Progress*, v. 53, Feb. 1957, p. 72F-77F.

A fluoride distillation pilot plant has demonstrated the effectiveness of fractionation as a method for decontaminating uranium hexafluoride from mixed fission-product fluorides.

9040 Time to Turn the Atom to Profit. CW Report. I. Incentives for Chemical Process Industries. II. How to Find and Develop Your Opportunities. Raymond E. Vener. *Chemical Week*, v. 80, Mar. 9, 1957, p. 45 + 33 pages.

A comprehensive report on opportunities for chemical process companies in nuclear energy, and how to find and develop these opportunities.

9041* (French.) The Interaction of Negative K Mesons at Rest With Two Nucleons. **Sur l'interaction des mésons *K* négatifs aurepos avec deux nucléons.** André Berthelot, Odette Goussu, Françoise Lévy, and Livio Scarsi. *Comptes Rendus*, v. 244, Jan. 21, 1957, p. 447-450.

Observation of two interactions of negative *K* mesons at rest which require the simultaneous intervention of two nucleons, and a certain number of other interactions for which this intervention is very probable.

9042* (Russian.) Cross-Sections for Photoproduction of π^0-Mesons as Dependent on Mass Numbers of Nuclei. **Zavisimost' sechenii fotoobrazovaniia π^0-mezonov ot massovykh chisel iader.** B. B. Goborkov, V. I. Goldanskii, O. A. Karpukhin, A. V. Kutsenko, and V. V. Pavlovskaia. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 37-40.

Cross-sections were studied as influenced by the γ-quanta of retarded radiations from various nuclei. The maximum energy of the spectrum of the retarded radiation varied between 170 and 340 m.e.v.

9043* (Russian.) On the Role of Bound States in Photoproduction Processes. **O roli sviazannykh sostoianii v protsessakh fotorozhdeniia.** A. A. Logunov, B. M. Stepanov, and A. N. Tavkhelidze. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 45-47.

Studies bound states in dispersion relationships, a problem related to the analysis of the unobservable fields of energy of these relationships.

9044* Engineering Problems in the Application of Nuclear Energy. Claude D. Gibb. *Engineer*, v. 203, Feb. 22, 1957, p. 282-285.

Some details of a British nuclear power station. (To be continued.)

9045 Frequency Response Measurements of Power Reactor Characteristics. H. Estrada, Jr. *Institute of Radio Engineers, Transactions on Nuclear Science*, v. NS-4, Mar. 1957, p. 15-19. (TK1 In6.6ns Contin.)

Measurement of power reactor characteristics in the power range of operation can be effected by means of a technique utilizing the frequency response of a number of key plant variables to perturbations in rod position.

9046 A Self-Checking Radiation Monitor. K. C. Speh and W. E. Landauer. *Institute of Radio Engineers, Transactions on Nuclear Science*, v. NS-4, Mar. 1957, p. 19-25. (TK1 In6.6ns Contin.)

Three basic channels are provided to measure accurately the γ radiation in the range from 1 to 1000 mr. per hr., the thermal neutron flux from 20 to 20,000 thermal neutrons per sq. cm. per sec., and the air-particle concentration from 10^{-9} to 10^{-6} μC per cc., or from 10^{-8} to 10^{-5} C per cc.

9047 Joint Action by OEEC Countries in the Field of Nuclear Energy. 170 p. 1956. Organisation for European Economic Co-Operation, Paris. (HD9698 Or3j)

Report covers various technical aspects of the joint undertakings, security control, intra-European trade, legislation, training, and standardization.

9048 Atomic Scattering Factors Calculated From the TFD Atomic Model. L. H. Thomas and K. Umeda. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 293-303.

Tabulated scattering factors for neutral atoms as well as for singly through quadruply ionized positive ions with intermediate atomic numbers.

9049 The Mass Yield Curve for Fission of Am^{241} by Pile Neutrons. J. G. Cuninghame. *Journal of Inorganic and Nuclear Chemistry*, v. 4, Feb. 1957, p. 1-7.

Relative fission yields for 19 mass chains. Chemical separations and purification of Am.

9050 Gamma-Ray Yields From the Resonant Capture of Slow Neutrons. E. R. Rae and E. M. Bowey. *Journal of Nuclear Energy*, v. 4, Feb. 1957, p. 179-190 + 1 plate.

Measuring apparatus. Gamma-ray spectra for the first ten levels in Ag.

9051* (French.) Application of Nuclear Recoil to the Preparation of Radioactive Isotopes Without Entrainment Agents. **Application du recul nucléaire a la préparation d'isotopes radioactifs sans entraineur.** J. Pauly and P. Süe. *Journal de Physique et le Radium*, v. 18, Jan. 1957, p. 22-26.

The radioactive isotopes produced by a nuclear reaction that does not change the atomic number can be isolated by physicochemical processes or by using the nuclear recoil taking place during the reaction. The distance covered by the atomic nuclei was determined as a function of the energy developed.

9052* (French.) Effect of Electronic and Molecular Concentrations on the Apparent Probability of the Transition $A^3\Sigma u$-$X^1\Sigma g$ in the Nitrogen Molecule. **Influence des concentrations électronique et moléculaire sur la probabilité apparente de la transition $A\ ^3\Sigma u$-$X^1\Sigma g$ de la molécule d'azote.** P. Schram, R. W. Lunt, and L. Herman. *Journal de Physique et le Radium*, v. 18, Jan. 1957, p. 59-67.

Experiments show that quantitative information on the deactivation by collisions of the excitation states can be obtained by simultaneously measuring the intensity and the electronic concentration.

9053 Thermal Quenching in Alpha- and Gamma-Excited Fluorescent Solutions. H. H. Seliger and C. A. Ziegler. *Journal of Research, National Bureau of Standards*, v. 58, Mar. 1957, p. 125-126.

From room temperature down to −35 C the relative light outputs increase markedly under both α and γ excitation.

9054 Two-Dimensional r-θ Multigroup Calculations. E. L. Wachspress. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1641, Aug. 1954, 50 p. (UF767 Un3.1ka Contin.)

Two-dimensional multigroup calculations have proved to be a powerful tool in reactor analysis, making it possible to get accurate estimates for reactivity, power, and fluxes of complex reactor configurations.

9055 Group Averaged Absorption Cross Sections in the Resonance Region for Some Hafnium Isotopes. T. F. Ruane, M. L. Storm, P. J. Tetrault, and M. C. Conerty. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1635, Nov. 1956, 31 p. (UF767 Un3.1ka Contin.)

Cross sections are applied to the evaluation of central reactivity coefficients for zero thickness samples in an intermediate-spectrum reactor, and comparison is made with experimental reactivity coefficients measured in a critical assembly.

9056 Management, Economics and Technology for the Atomic Industry. v. I. Management and International Affairs. v. II. Economics and Technology. William J. Smith, editor. 282 and 308 p. 1956. Atomic Industrial Forum, Inc., New York. (QC792 At71m Over.)

Includes papers on legal problems, manpower requirements, power reactor technology, costs and economic factors, reactor materials, research programs, and radiation utilization.

9057 Considerations in the Selection of a Nuclear Fuel. Frank A. Rough and Henry A. Saller. Paper from "Management, Economics and Technology for the Atomic Industry. v. II. Economics and Technology". Atomic Industrial Forum, Inc. 1956. p. 135-138. (QC792 At71m Over.)

Reviews problems associated with solid fuels and indicates regions where further development is needed or expected. Since less is known about operation of fuels at the high temperatures which characterize recent reactor designs, the performance of both the core materials and of the composite of core and clad must be proven. Further development of the refractory metals for these cladding applications may also be profitable.

9058 The Battelle Research Reactor. A Case History. H. R. Nelson. Paper from "Management, Economics and Technology for the Atomic Industry. v. II. Economics and Technology". Atomic Industrial Forum, Inc. 1956. p. 203-212. (QC792 At71m Over.)

Describes the Institutes' pool reactor and its associated physical plant including economics of the installation, operating schedule, and current applications.

9059* Nuclear Power Plants. *Mechanical Engineering*, v. 79, Mar. 1957, p. 233-247.

How various nuclear-reactor systems are being applied commercially to steam generation of electric power.

9060* (German.) Effects of Energy-Rich Radiation on Various Substances. **Einwirkung energiereicher Strahlung auf Werkstoffe.** W. Hanle. *Metall*, v. 11, Feb. 1957, p. 91-99.

Exact meaning of energy rich radiations, their sources, and theoretical interpretation of their effects on liquids, metals, graphite, semiconductors, non-conductors, and organic substances.

9061 The Disordering of Polyatomic Solids by Neutrons. E. G. Harris. *Naval Research Laboratory, Report* 4807, Aug. 1956, 10 p. (T21 Un3.5n Contin.)

A general method is outlined for calculating the number of vacant lattice sites of interstitial atoms produced in a polyatomic solid by neutron radiation.

9062 On the Formulation and Analysis of Numerical Methods for Time-Dependent Transport Equations. Herbert B. Keller and Burton Wendroff. *New York University, Institute of Mathematical Sciences (U. S. Atomic Energy Commission)*, NYO-7694, Dec. 1956, 38 p. (UF767 U3ny Contin.)

9063 A Numerical Method for the Time-Dependent Transport Equation. R. D. Richtmyer. *New York University, Institute of Mathematical Sciences (U. S. Atomic Energy Commission),* NYO-7696, Feb. 1957, 40 p. (UF767 U3ny Contin.)

A finite difference method devised for the numerical solution of the integro-differential equation of neutron transport in a sphere is applied to one-group problems with isotropic scattering.

9064 Reactor Safety Quarterly Progress Report. May-July 1956. N. C. Miller. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1810, Mar. 1957, 30 p. (UF767 Un3.1na Contin.)

Impact tests on the Mark III Hanford safety element indicate that the design is mechanically adequate and does not constitute a personnel hazard. An external poison-storage device was designed. Cd-Bi-In, Cd-Hg, and Cd-Bi-Pb-Sn alloys were investigated as possible liquid poisons for the power reactor safety element.

9065 PRE Quarterly Progress Report October-December 1956. D. I. Sinizer, J. R. Foltz, K. L. Mattern, and E. E. Motta. *North American Aviation, Inc. (U. S. Atomic Energy Commission),* NAA-SR-1855, Mar. 1957, 55 p. (UF767 Un3.1na Contin.)

PRE is a fuel reprocessing experiment directed toward the development of a low cost fuel decontamination and refabrication plan for metallic U fuel. High temperature techniques are to be used for the partial decontamination, re-enrichment, and recasting of U fuel followed by refabrication of the U slugs into fuel rods suitable for re-irradiation in SRE.

9066* Nuclear Reactor Data. 24 p. 1956. Raytheon Manufacturing Co., Waltham, Mass. (QC786 R21n)

A comprehensive tabulation of the principal characteristics of nuclear reactors throughout the world.

9067 The Engineering Test Reactor. *Nucleonics,* v. 15, Mar. 1957, p. 41-56.

Describes details of design, construction, and facilities set against the larger frame of the burgeoning need for test-reactor facilities.

9068 Measuring Flux Absolutely With Indium Foils. Moses A. Greenfield, Roscoe L. Koontz, Alan A. Jarrett, and Juanita K. Taylor. *Nucleonics,* v. 15, Mar. 1957, p. 57-61.

Absolute β counting of weighted indium foils with a two π flow counter is advanced for measuring absolute thermal neutron flux in a reactor.

9069* (English.) **Fermi Coupling and Mass and Charge Spectra of Bosons.** B. Jouvet. *Nuovo Cimento,* v. 5, ser. 10, Jan. 1957, p. 1-20.

9070* (English.) **Integral Equations for Meson Field Theory.** R. L. Mills. *Nuovo Cimento,* v. 5, ser. 10, Jan. 1957, p. 30-44.

A covariant method of approximating the nucleon Green's function is described, in terms of the solution of a connected sequence of linear integral equations.

9071* (English.) **On the Properties of Spin 2 Particles.** T. Regge. *Nuovo Cimento,* v. 5, ser. 10, Feb. 1957, p. 325-336.

9072* (English.) **Interactions of K^+-Mesons With Emulsion Nuclei Between 40 and 160 MeV.** M. Baldo Ceolin, M. Cresti, N. Dallaporta, M. Grilli, L. Guerriero, M. Merlin, G. A. Salandin, and G. Zago. *Nuovo Cimento,* v. 5, ser. 10, Feb. 1957, p. 402-434.

9073* (English.) **On the Scattering of K^+-Mesons by Nucleons in Perturbation Theory.** C. Ceolin and L. Taffara. *Nuovo Cimento,* v. 5, ser. 10, Feb. 1957, p. 435-447.

Using the method of Feynman and considering both the Λ and Σ-particles as intermediate states, the differential and total cross-sections for the scattering of scalar and pseudoscalar K^+-mesons by nucleons were calculated in the second order approximation of perturbation theory.

9074* (English.) **On the Correlation of the Intensity of μ^-- and μ^+-Mesons With the Pressure at Sea-Level, and With the Height of the 100 mb Layer.** U. Fasoli, C. Maroni, I. Modena, E. Pohl, and J. Pohl-Rüling. *Nuovo Cimento,* v. 5, ser. 10, Feb. 1957, p. 473-482.

Vertical intensities were measured by means of a counter apparatus with magnetic discrimination for the sign of charge.

9075* (English.) **Report on the τ-Mesons. II.** E. Amaldi. *Nuovo Cimento,* v. 4, ser. 10, Suppl., 1956, p. 179-215.

Characteristics of all τ-mesons so far observed in stripped emulsion.

9076* (English.) **Interactions of Negative K-Particles at Rest.** W. W. Chupp, G. Goldhaber, S. Goldhaber, and F. H. Webb. *Nuovo Cimento,* v. 4, ser. 10, Suppl., Sept. 1956, p. 382-389.

9077* (English.) **Recent Cloud Chamber Results on Masses of Heavy Mesons and Hyperons.** W. H. Arnold, J. Ballam, A. L. Hodson, G. K. Lindeberg, R. R. Rau, G. T. Reynolds, and S. B. Treiman. *Nuovo Cimento,* v. 4, ser. 10, Suppl., Sept. 1956, p. 559-564 + 2 plates.

9078* (English.) **Results on Heavy Mesons and Hyperons From Cloud Chamber Ionization Measurements.** W. B. Fretter, E. W. Friesen, and A. Lagarrigue. *Nuovo Cimento,* v. 4, ser. 10, Suppl., Sept. 1956, p. 569-587.

9079* (English.) **The Properties of the Heavy Unstable Particles.** R. W. Thompson. *Nuovo Cimento,* v. 4, ser. 10, Suppl., Sept. 1956, p. 642-686.

Properties of hyperons and heavy mesons. Production and nuclear interactions.

9080* (English.) **Scattering of Elementary Particles With Spin s in a Coulomb-Field.** F. Cap and H. Donnert. *Nuovo Cimento,* v. 4, ser. 10, Suppl., Sept. 1956, p. 817-824.

9081* (English.) **Disintegrations of Light Nuclei Induced by Slow Negative π-Mesons in Photographic Emulsion.** G. Vanderhaeghe and M. Demeur. *Nuovo Cimento,* v. 4, ser. 10, Suppl., Sept. 1956, p. 931-938.

9082 Specifications for HRT Reactor and Service Systems. W. R. Gall. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* CF-55-8-111, June 1956, 278 p. (UF767 Un3.1cf Contin.)

9083 A Homogeneous-Reactor Gamma Irradiation Facility. R. B. Briggs and J. O. Kolb. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* CF-56-7-126, July 1956, 15 p. (UF767 Un3.1cf Contin.)

A reactor power level of 15 Mw. would be required to obtain a source that would irradiate 6-in. x 16-in. x 20-in. boxes of meat to a dose of 2×10^6 rep in 30 min. and at a rate of 2800 lb. per hr.

9084 Homogeneous Reactor Project, Quarterly Progress Report for Period Ending October 31, 1956. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2222, Feb. 1957, 165 p. (UF767 U3o Contin.)

Recent progress in testing program, reactor design and analysis, engineering development, corrosion and materials, chemical engineering development, and supporting chemical research.

9085 Preparation of Thin Tritium-Zirconium Targets. B. J. Massey. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2237, Feb. 1957, 8 p. (UF767 U3o Contin.)

Equipment and procedures involved in impregnating the Zr film with tritium.

9086 Radiation Fluxes in a Cylindrical Cavity Resulting From an Idealized Entering Current. C. D. Zerby. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission),* ORNL-2177, Mar. 1957, 35 p. (UF767 U3o Contin.)

Equations are developed for the cases when the cylinder is of finite length and the flux is obtained along the centerline, and when the cylinder extends to infinity in one direction from the plane in which the flux is determined along the radial from the center.

9087 Measurements of MTR-Irradiated Thorium Slugs in the Reactivity Measurement Facility. E. Fast and D. R. deBoisblanc. *Phillips Petroleum Co., Idaho Operations Office (U. S. Atomic Energy Commission),* IDO-16255, Mar. 1956, 18 p. (UF767 Un3.1id Contin.)

Development of nondestructive method for assaying U-233 content.

9088 Interaction Lengths and Diffraction Scattering of 4.2 GeV π-Mesons in G5 Emulsion. J. O. Clarke and J. V. Major. *Philosophical Magazine*, v. 2, ser. 8, Jan. 1957, p. 37-48.

Total interaction length is found to be 27.1 ± 2.4 cm. and the individual interaction lengths for the production of stars and scatters are 38.7 ± 3.5 cm. and $90 \pm {}^{25}_{15}$ cm. respectively.

9089 Isotopic Spin Selection Rules. IX. The 9·58 MeV State of ^{16}O. X. The 7·18 MeV State of ^{20}Ne. B. J. Toppel, S. D. Bloom, and D. H. Wilkinson. **XI. The 8·06 and 6·23 MeV States of ^{14}N.** D. H. Wilkinson and S. D. Bloom. **XII. The Mirror Reactions ^{6}Li(d,n)^{7}Be and ^{6}Li(d,p)^{7}Li.** D. H. Wilkinson. *Philosophical Magazine*, v. 2, ser. 8, Jan. 1957, p. 57-93.

9090 ^{8}Li Emission From Heavy Element Disintegrations Produced by 5·7 BeV Protons. S. J. Goldsack, W. O. Lock, and B. A. Munir. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 149-156.

A stack of Ilford G5 emulsions exposed to the 5·7 BeV proton beam of the Bevatron was searched for disintegrations of Ag and Br nuclei with ejected ^{8}Li fragments and 91 examples found.

9091 The Low Energy End of the Cosmic Ray Spectrum of Alpha-Particles. P. H. Fowler, C. J. Waddington, P. S. Treier, J. Naugle, and E. P. Ney. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 157-175.

The cut-off energies experienced by cosmic ray particles over the American continent are probably lower than those predicted by geomagnetic theory.

9092 A Comparison of Electron and Positron Single Scattering in Argon. C. Bowness and N. Cusack. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 196-203.

9093 A Simple Treatment of Meson-Nucleon Scattering. S. F. Edwards and P. T. Matthews. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 176-181.

The p-wave meson-nucleon scattering cross sections can be very simply explained by calculating the first order effective potential between meson and nucleon and the scattering in this potential.

9094 The Elastic Scattering of Protons by Protons at 925 MeV. P. J. Duke, W. O. Lock, P. V. March, W. M. Gibson, J. G. McEwen, I. S. Hughes, and H. Muirhead. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 204-214.

9095 The Production of π-Mesons in Proton-Proton Collisions at 925 MeV. I. S. Hughes, P. V. March, H. Muirhead, and W. O. Lock. *Philosophical Magazine*, v. 2, 8th ser., Feb. 1957, p. 215-230.

Production of a single π^{+}-meson with a neutron and a proton predominates over all other processes; production of two π-mesons rarely occurs in proton-proton collisions at 925 m.e.v.

9096 Quantum-Mechanical Many-Body Problem With Hard-Sphere Interaction. Kerson Huang and C. N. Yang. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 767-775.

A generalization of Fermi's pseudopotential enables formulation of the problem entirely in terms of the scattering phase shifts.

9097 Nuclear Scattering of 50- to 130-Mev γ Rays. George E. Pugh, Ricardo Gomez, David H. Frisch, and G. Sargent Janes. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 982-995.

The energy distribution of scattered γ-rays at 45, 90, and 135° was measured using targets of H, D, Li, Be, C, Cu, and Sn.

9098 Energies of Nuclei With Different Proton and Neutron Shells. S. Goldstein and I. Talmi. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 995-1002.

9099 Atomic Masses in the Region Xenon to Europium. W. H. Johnson, Jr. and A. O. Nier. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 1014-1023.

9100 Antiproton-Nucleon Annihilation Process (Antiproton Collaboration Experiment). *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 1037-1058.

Annihilation proceeds primarily through pion production with occasional emission of K particles. A total energy balance of particles emitted in the annihilation gives a ratio of charged to neutral pions consistent with charge independence.

9101 Meson Production in *n-p* Collisions at Cosmotron Energies. W. A. Wallenmeyer. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 1058-1067.

9102 Photoproduction of Charged Mesons From Deuterons. S. Penner. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 1113-1116.

Photoproduction cross sections are calculated in the impulse approximation. Expressions for the angular distribution and total cross section are obtained in terms of free nucleon cross sections and the nuclear potential.

9103 Electron Capture by Protons Passing Through Hydrogen. Trilochan Pradhan. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1250-1259.

The capture problem is investigated by the formal methods of collision theory and an approximation scheme is developed.

9104 Low-Energy Activation Functions for Photofission of U^{238} and Th^{232}. R. A. Schmitt and R. B. Duffield. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1277-1284.

Functions were determined over the energy range 4.5 to 10 m.e.v.

9105 Angular Correlation Measurements in the Decay of Hg^{197}. Horace H. Coburn, John V. Kane, and Sherman Frankel. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1293-1300.

9106 Differential Cross Sections for the Scattering of Medium Energy Protons on Carbon. Robert W. Peelle. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1311-1323.

9107 Inelastic Scattering of 12-Mev Protons on Lithium, Carbon, Magnesium, and Silicon. Homer E. Conzett. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1324-1331.

9108 Antineutrino Flux From a Reactor. C. O. Muehlhause and S. Oleksa. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1332-1334.

Flux distribution is determined from a measurement of the equilibrium β-ray spectrum from thermal neutron fission of U^{235}.

9109 New Radioisotope of Platinum—Pt^{200}. L. P. Roy, Jean-Claude Roy, and Janet S. Merritt. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1337-1338.

Radioisotope with an 11.5-hr. half-life was produced by successive neutron capture in Pt^{198}. The activation cross section for the reaction Pt^{199} (n,γ) Pt^{200} is approximately 15 barns.

9110 Fission Cross Section of U^{235} for Fast Neutrons. B. C. Diven. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1350-1353.

Cross section has a constant value of 1.27 ± 0.044 barns in the neutron-energy interval between 1.0 and 1.5 m.e.v.

9111 Measurement of the Radiative Correction to Electron-Proton Scattering by Observation of the Absolute Cross Section. George W. Tautfest and W. K. H. Panofsky. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1356-1368.

9112 Multiple Scattering by Quantum-Mechanical Systems. K. M. Watson. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1388-1398.

Formal development of the multiple scattering problem. Applications to transport theory.

9113* On an Extended Framework for the Description of Elementary Particles. Mineo Ikeda and Yoshihiko Miyachi. *Progress of Theoretical Physics*, v. 16, Dec. 1956, p. 537-547.

9114* Meson-Nucleon Scattering in Low Energy Region. Daisuke Itô and Shigeo Minami. *Progress of Theoretical Physics*, v. 16, Dec. 1956, p. 548-554.

9115* On a Theory of a Composite Model of Elementary Particles. Ziro Maki. *Progress of Theoretical Physics*, v. 16, Dec. 1956, p. 667-683.

Sakata's proposed model can be formulated as a covariant theory of bound states. The forces among fundamental particles from which the composite pions, heavy mesons, and hyperons are supposed to be constructed are derived from assumed basic interactions of the Fermi type.

9116 The Overthrow of Parity. Philip Morrison. *Scientific American*, v. 196, Apr. 1957, p. 45-53.

Recent meson decay experiments have proved a distinction in nature between left and right.

9117 Thermal Power From Nuclear Reactors. A. Stanley Thompson and Oliver E. Rodgers. 229 p. 1956. John Wiley & Sons, New York. (QC776 T37t)

Engineering problem-solving techniques, such as numerical and dimensional analysis, are applied to problems of reactor development such as thermal stresses, transient behavior of reactors, and distribution of γ-rays and neutrons.

9118 Thermal - Neutron - Capture Gamma - Ray Spectrum From U^{238}. R. W. Kenney and J. T. Mattingly. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-4735, Oct. 1956, 13 p. (UF767 U3u Contin.)

9119 Production of Prolonged Secondary Particle Beams in the Bevatron With Thin Foils. Harry G. Heard. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3608, Dec. 1956, 6 p. (UF767 U3u Contin.)

A thin energy-loss foil located on the outer radius of the Bevatron aperture was used to produce a secondary-beam pulse of up to ½-sec. duration. The secondary beam pulse is reproducible from pulse to pulse and shows no time dependence due to the R.F. accelerating voltage.

9120 Bevatron Operation and Development. XI. Walter Hartsough. *University of California, Radiation Laboratory (U. S. Atomic Energy Commission)*, UCRL-3614, Dec. 1956, 20 p. (UF767 U3u Contin.)

Details of experimental facilities, pole-base-winding field correction, R.F. tracking equipment, and magnet power supply.

See also: **7878** (cosmic ray studies); **7960** (irradiation equipment); **7996** (oxide fuel elements); **8003** (effects of radiation on graphite); **8049** (studies of radioactive gases); **8337** (reactivity computer); **8346** (nuclear activity monitoring); **8351** (computer for reactor design); **8376** (direct production of electric power); **8464** (counter for fast particles); **8600** (atomic power reactor); **8650** (radiation-resistant grease); **8651** (reactor lubricants); **8660** (atomic-powered locomotive); **8695** (liquid metal coolants); **8715** (metallurgical problems of nuclear reactors); **8716** (radiation effects in metals); **8721** (reactor metallurgy); **8866** (effects of radiation on tensile properties of uranium); **8978** (effects of radiation on crystal structure); **9150** (recovery of spent fuel); **9244** (radiation effects on plastics); **9272** (radiation of high polymers); **9279** (treatment of radioactive wastes); **9285** (fallout of Sr^{90}); **9286** (radioactive waste disposal); **9346** (welding techniques for atomic plants); **9369** (effects of radiation on weldability of steel).

OPERATIONS RESEARCH AND MANAGEMENT ENGINEERING

9121 Analysis for Production Management. Edward H. Bowman and Robert B. Fetter. 503 p. 1957. Richard D. Irwin, Inc., Homewood, Ill. (TS155 B68a)

A college text designed to orient the student in decision making and problem solving. Methods involved in mathematical programming, statistical analysis, and economic analysis are illustrated by specific manufacturing examples.

9122 Anthropometry and Human Engineering. 123 p. 1955. Butterworths Scientific Publications, London. (TL671.2 N81.1a)

Eleven articles relating human factors to aircraft design.

9123 The Application of Human Body Size Data to Vehicular Design. Ross A. McFarland, Albert Damon, and Howard W. Stoudt. 18 p. 1955. (TL250 M16a Over.)

Gives the 5th, 50th, and 95th percentiles of 30 pertinent body dimensions. Cab dimensions are related to static human body size, and to the dynamic aspects of body size and capabilities.

9124 Company Investigations of Automatic Data Processing. Peter B. Laubach. 258 p. 1957. Harvard University, Boston. (HF5548 L36c)

A discussion of the approaches taken by various companies in investigating their data-processing needs to determine what, if any, automatic equipment they should acquire.

9125* Work Sampling Techniques in Work Study. J. A. C. Williams. *Engineer*, v. 203, Feb. 15, 1957, p. 245-249.

Ratio delay and memomotion (time lapse photography) techniques are compared.

9126* Executive Development. A Bibliographic Review, No. I. 36 p. 1954. Industrial Relations Center, University of Chicago. (Z7164.C81 C43e Ref.)

9127 On the Statistics of Individual Variations of Productivity in Research Laboratories. William Shockley. *I.R.E., Proceedings*, v. 45, Mar. 1957, p. 279-290.

The number of an individual's publications is used as a measure of scientific production. Some conclusions are drawn about the relationship of salary to productivity.

9128 Operations Research as a Managerial Instrument of Advice and Decision. Z. Prihar. *Institute of Radio Engineers, Transactions on Engineering Management*, v. EM-4, Mar. 1957, p. 4-8. (TK1 In6.6em Contin.)

Analysis and appraisal of various methods employed, their scientific importance, suggestions for their assimilation to other fields, and a discussion on the possible application of information theory to operations research.

9129 Operations Research. Philip M. Morse. *Institute of Radio Engineers, Transactions on Military Electronics*, v. MIL-1, Mar. 1957, p. 4-9.

Mathematical models can bring a unification of viewpoint that is valuable in studying operations so that they may be optimally controlled.

9130* Electronic Data Processing Comes to Time Study. Joseph Motycka and Travers Auburn. *Journal of Industrial Engineering*, v. 8, Jan.-Feb. 1957, p. 11-18.

Automatic processing reduces the menial work by two-thirds, allowing for greater production and more careful work analyses.

9131* Automation; Its Impact on Industrial Engineering. William B. Wolf. *Journal of Industrial Engineering*, v. 8, Jan.-Feb. 1957, p. 25-29.

Discussion is limited to use of the digital computer. Applications are cited.

9132 Manual of Excellent Managements. 288 p. 1957. American Institute of Management, New York. (HD31 Am35m Vis.)

Information on American and Canadian companies whose management practices earn a rating of excellent. Includes names and positions of executives, products, and financial auditors.

9133* The Role of Operational Gaming in Operations Research. Clayton J. Thomas and Walter L. Deemer, Jr. *Operations Research Society of America, Journal*, v. 5, Feb. 1957, p. 1-27.

Chance effects require a sample of plays to be statistically adequate, but competitive effects require a sample of plays to be strategically adequate, which is often overlooked.

9134* Bibliography on Linear Programming. F. Virginia Rohde. *Operations Research Society of America, Journal*, v. 5, Feb. 1957, p. 45-62.

See also: **8688** (operating parameters in transport planes).

ORE AND MATERIALS BENEFICIATION

9135 Effect of Phosphate Rock Particle Size on Recovery of Uranium From Superphosphate. William Wayne Davis and Morton Smutz. *Ames Laboratory (U. S. Atomic Energy Commission)*, ISC-678, Dec. 1955, 26 p. (UF767 Un3.1is Contin.)

Recovery in a 30 min. reaction-extraction increases significantly with a decreasing phosphate rock particle size.

9136 Roasting of Ore Flotation Concentrates. P. F. Snezhko. *Henry Brutcher Translation No.* 3825, 10 p. (Abridged from *Stal'*, v. 16, no. 4, 1956, p. 327-330.) Henry Brutcher, Altadena, Calif.

Comparison of the desulfurization of flotation concentrates of titanomagnetite and wolframite in stationary hearth and in rotating drum furnaces.

9137 Production of Self-Fluxing Sinter From Fine Concentrates. L. R. Migutskii. *Henry Brutcher Translation No.* 3851, 9 p. (From *Metallurg*, v. 1, no. 10, 1956, p. 5-7.)

Production of high-basicity sinter, satisfactory for 100%-sinter charges in blast furnaces, from fine concentrates containing siliceous gangue.

9138 Radioactive Tracer Investigations in a Flotation Circuit. G. G. Eichholz, W. B. Muir, M. J. S. Bennett, J. D. Wild, C. Lawton, and S. Mostowy. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 121-127.

9139 Pilot Plant Testing of Uranium Ores at the Mines Branch, Ottawa. W. A. Gow, H. W. Smith, and R. Simard. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 128-133.

Reviews this agency's role in U mining developments.

9140 Development of Tungsten Ore Dressing Practice. H. H. Kipp. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 134-136.

Results from a new W mill for the dressing of scheelite ore.

9141 Tungsten Milling and Current Metallurgy at Canadian Exploration, Limited. R. J. McLeod. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 137-142.

9142 The Uranyl-Ammonium Phosphate Process for Recovery of Uranium From Slag Scrap. E. R. Johnson, E. O. Rutenkroger, A. B. Kreuzmann, and B. C. Doumas. *Chemical Engineering Progress*, v. 53, Feb. 1957, p. 56F-59F.

Process was successful in recovering U from MgF_2 slag in yields in excess of 98%. The resulting sodium-diuranate-type product generally assays 55% U, 3 to 5% phosphate, and $<0.2\%$ fluoride.

9143 Reactor Grade Uranium by Extraction of Slurries. D. S. Arnold and B. G. Ryle. *Chemical Engineering Progress*, v. 53, Feb. 1957, p. 63F-64F.

The extraction of reactor grade U by tributyl phosphate from essentially pure uranyl nitrate-nitric acid solutions appears feasible. Various impurities in the ores can greatly affect product purity, product recovery, and refinery operations.

9144 Uranium Recovery From Aqueous Wastes. R. J. Clouse, J. Dykstra, and B. H. Thompson. *Chemical Engineering Progress*, v. 53, Feb. 1957, p. 65F-69F.

Solutions derived from cleaning gaseous diffusion equipment contain isotopically enriched U. The facility for recovering this U, processing it to an oxide, and fluorinating the oxide to uranium hexafluoride is reviewed.

9145 Preparation of Power Reactor Fuels for Aqueous Processing. J. E. Savolainen and R. E. Blanco. *Chemical Engineering Progress*, v. 53, Feb. 1957, p. 78F-81F.

The Darex process uses dilute aqua regia to dissolve stainless steel fuels and distillation to recover HCl and HNO_3 in Ti equipment. The Zircex process uses HCl gas or a liquid inorganic chlorinating agent to remove selectively Zr from jacket or core alloys at 300-400 C as volatile $ZrCl_4$.

9146 Oxidized Copper. III. An Expert Looks at the Furture Processing Methods. Nathaniel Arbiter. *Engineering and Mining Journal*, v. 158, Mar. 1957, p. 80-85.

The methods, ideas, and problems to consider in designing a mill for profitably treating ores.

9147 A New Look at Slag Fuming. H. H. Kellogg. *Engineering and Mining Journal*, v. 158, Mar. 1957, p. 90-92.

9148 Mon-Cataracting Ball Mill Study. J. F. Myers and F. C. Bond. *Engineering and Mining Journal*, v. 158, Mar. 1957, p. 98-105.

Critical review of grinding theories.

9149 Flotation. A. M. Gaudin. 2nd Ed. 573 p. 1957. McGraw-Hill, New York. (TN523 G23f2)

A scientific analysis of the foundations, technology, and applications of the flotation process for the separation of dissimilar fine solid particles. Includes new material in the areas of crystal-, surface, and solution chemistry, and fluid mechanics.

9150* In Nuclear Power Production Recovery of Spent Fuel Is Important. H. B. Coats. *Industrial Wastes*, v. 2, Mar.-Apr. 1957, p. 49-51.

Reasons for reprocessing; possibilities for reducing the costs.

9151 Roasting Reaction of Ferrous Sulfide. Kichizo Niwa, Tsuguyasu Wada, and Yutaka Shiraishi. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Feb. 1957, p. 269-273.

Complete oxidation begins at 600 C. At the initial stage of oxidation, a slight increase of weight occurs. Above 600 C the rate of oxidation does not change with temperature, so the rate-determining factor is diffusion of gas.

9152 Some Aspects of the Physical Chemistry of Hydrometallurgy. J. Halpern. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Feb. 1957, p. 280-289.

Thermodynamic and kinetic considerations. Leaching and precipitation reactions.

9153 Cobalt Pressure Leaching and Reduction at Garfield. J. S. Mitchell. *Journal of Metals*, v. 9, Mar. 1957, p. 343-345.

Principal steps in the recovery of Co from arsenical concentrates are autooxidation acid leaching under pressure, filtration of the tailings, purification of the solution, H reduction of the ammoniacal solution, and melting in an electric arc furnace to remove S and granulate the metal.

9154 Differential High-Temperature Sulfatization of Cuyuna Manganese Ore. Charles Prasky. *Journal of Metals*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 209, Mar. 1957, p. 377-380.

A progress report describing a sulfur dioxide-air roast process now under development on a small pilot-plant scale.

9155 (Russian.) Industrial Precipitation of Uranium by Ammonium Sulfide. **Industrisko talozhen'e urana amoniumsulfidom.** Vladimir G. Logomerac. *Khemiskog Drushtva Beograd, Glasnik*, v. 21, no. 4, 1956, p. 251-254.

Process is very effective, and yields consistently high U concentrations.

9156 The Adaptation of New Research Techniques to Mineral Engineering Problems. *Massachusetts Institute of Technology Department of Metallurgy (U. S. Atomic Energy Commission)*, NYO-7699, Oct. 1956, 36 p. (UF767 U3ny Contin.)

Electrochemical studies of adsorption on Ag_2S; adsorption of xanthate on Ag_2S; adsorption of inorganic ions on quartz; the solubility of quartz; effect of slime on the flotation of quartz and corundum; thickening and thickeners.

9157 Ion-Exchange Methods and Their Application to Metallurgical Problems. C. B. Amphlett. *Metallurgical Review*, v. 1, pt. 4, 1956, p. 419-477.

A review of progress since 1950 in fields of interest to the metallurgist and the inorganic chemist. Application to several metal separation processes and to water softening and demineralization.

9158 Filtration and Control of Moisture Content on Taconite Concentrates. A. F. Henderson, C. F. Cornell, A. F. Dunyon, and D. A. Dahlstrom. *Mining Engineering*, v. 9; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 208, Mar. 1957, p. 349-355.

9159 Separan 2610, a Flocculant for the Mining Industry. Merrill F. McCarty and Robert S. Olson. 11 p. Dow Chemical Co., Midland, Mich. (QD547 M12s Over.)

Flocculant is used to improve thickening, filtration, and clarification in almost every type of mining operation. Its properties, application methods, and typical and unique uses are summarized.

9160* (Russian.) Fluxed Sinter With Increased Magnesia Content. **Ofliusovannyi aglomerat s povyshennym soderzhaniem magnezii.** A. I. Gamaiurov and A. G. Neiasov. *Stal'*, v. 17, Jan. 1957, p. 20-24.

In order to increase the strength and reproducibility of sinter produced from sulfurous ores, it is expedient to raise the magnesia content.

9161* (Russian.) The Problems of Sinter Production. **Problemy aglomeratsionnogo Proizvodstva.** L. I. Kharash, M. I. Shiniakov, and S. I. Eliasberg. *Stal'*, v. 17, Feb. 1957, p. 106-114.

Experience with large machines of 200 sq. m. sintering surface.

9162* A Mineralogical Approach to the Development of the Uranium Extraction Processes Practised on the Witwatersrand. W. R. Liebenberg. *South African Institute of Mining and Metallurgy, Journal*, v. 57, Nov. 1956, p. 153-208.

Occurrence and characteristics of the ore; concentration methods; suggestions for reducing U losses in leach residues.

9163* Concentration Tests on the Gold Uranium Ores of the Witwatersrand for the Recovery of Uranium. J. Levin. *South African Institute of Mining and Metallurgy, Journal*, v. 57, Nov. 1956, p. 209-254.

9164* (Russian.) Stability of Flotation Foams. **K voprosu o stabil'nosti flotatsionnykh pen.** A. K. Livshits and S. V. Dudenkov. *Tsvetnye Metally*, v. 30, Jan. 1957, p. 14-23.

Effect of the nature and size of particles on the foam stability. Effect of hydrophobic particles and composition of ore.

9165* (Russian.) Using Hydrocyclones for Classification During the Crushing and Pre-Crushing Cycles of Ores. **Primenenie gidrotsiklonov dlia klassifikatsii v tsiklakh izmel'cheniia i doizmel'cheniia rud.** A. S. Kirillov and G. N. Shivrin. *Tsvetnye Metally*, v. 30, Feb. 1957, p. 14-21.

Economics of use; methods of combining with crushers; use as substitutes for mechanical classifiers.

9166 Laboratory Cleaning Trials on a Pennsylvania Anthracite in a Baum-Type Jig and a Dense-Medium Pilot Plant. H. F. Yancey and M. R. Geer. *U. S. Bureau of Mines, Report of Investigations* 5308, Feb. 1957, 23 p. (TN21 Un3r)

Clean coal surpassing standard anthracite specifications was obtained in all sizes from Stove through No. 5 Buckwheat by jigging. Recovery efficiencies were acceptable down to 3/16-in. size. Trials in a dense-medium pilot plant provided a recovery efficiency only 1% higher.

9167 Beneficiation of Iron-Copper Ores From Kasaan Peninsula, Prince of Wales Island, Alaska. R. R. Wells, E. G. Erspamer, and F. T. Sterling. *U. S. Bureau of Mines, Report of Investigations* 5312, Feb. 1957, 15 p. (TN21 Un3r)

Optimum results can be obtained by flotation of ore ground to −100 mesh, with subsequent wet magnetic separation treatment of the flotation tailing.

See also: **8541** (preparation of coking coal).

PHYSICS

9168 (English.) **Rapid Measurement of Ultrasonic Velocity in a Liquid.** N. B. Terry. *Acustica*, v. 6, no. 6, 1956, p. 521-525.

A measurement of ultrasonic velocity is made by simply tuning the modulating frequency to a minimum output from the photocell of the apparatus.

9169 (German.) Nonlinear Vibrations of Bubbles in Water. **Nichtlineare Schwingungen von Luftblasen in Wasser.** W. Güth. *Acustica*, v. 6, no. 6, 1956, p. 532-538.

Both in free and forced vibration, the changes of frequency, mean bubble radius, and the mean internal air pressure are calculated in their dependence on amplitude.

9170* (German.) Visualizing Fixed Ultrasonic Fields and Transposing Acoustic Into Optical Images. **Sichtbarmachung von Stehenden Ultraschallfedern und Akustisch-Optische Bildwandlung.** Gertrud Keck. *Acustica*, v. 6, no. 6, 1956, p. 543-548.

The photographic plate, usually insensitive to ultrasonics, can be made quite sensitive thereto by irradiating the developed Ag films of a plate in a reversal bath. In this way it is possible under exposure times of the order of seconds, even in weak sound fields, to obtain practical acoustic-optical images.

9171 Scattering of Sound by Sound. Peter J. Westervelt. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 199-203.

A source function is obtained for the lowest order scattering process which is quadratic in the primary field variables.

9172 Plane Waves in a Thermoelastic Solid. H. Deresiewicz. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 204-209.

In an isotropic, thermoelastic solid two distinct dilational waves exist which are dispersed and exponentially attenuated in the medium. Relations are given expressing the variation, in each, of phase velocity, amplitude attenuation, and specific loss with impressed frequency.

9173 On Scattering and Reflection of Sound by Rough Surfaces. Victor Twersky. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 209-225.

9174 On the Reflection of Sound at an Interface of Relative Motion. John W. Miles. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 226-228.

In addition to the possibility of total reflection in some range of angles of incidence at all finite, relative speeds, there exists the possibility of a reflection coefficient exceeding unity for sufficiently high, supersonic speeds.

9175 Condenser Microphones for Measurement of High Sound Pressures. John K. Hilliard and Walter T. Fiala. *Acoustical Society of America, Journal*, v. 29, Feb. 1957, p. 254-260.

Microphone distortion; construction of component elements; materials and tolerances; calibration and performance.

9176 The Thomas-Fermi Approximation in Quantum Mechanics. N. H. March. *Advances in Physics*, v. 6, Jan. 1957, p. 1-101.

Basic equations of the theory; applications to atoms, molecules, solids, and materials under high temperature.

9177 Electrostatic Potential in Crystals. Earl Callen. *American Journal of Physics*, v. 25, Mar. 1957, p. 138-149.

The periodic potential of the interior is modified at the surface by a redistribution of charge, which may be developed in terms of a number of related dipole double layers, space charge, and net surface charge. The image, exchange, and correlation fields, and the field of the net surface charge are presented.

9178 Some Recent Determinations of the Velocity of Light. II. Joseph F. Mulligan and Daniel F. McDonald. *American Journal of Physics*, v. 25, Mar. 1957, p. 180-192.

New experimental techniques include coincidence-counter determinations of γ-ray velocities, band-spectra methods, Froome's microwave interferometer, and Florman's R.F. interferometer. The present best value is 299,792.8 km. per. sec.

9179* (German.) A Contribution to the Statistics of a Uniform Particle System. The Exact Dynamic Basic Equations of Classic Statistics. **Zur Statistik der Systeme gleicher Teilchen. Die exakten dynamischen Grundgleichungen der klassischen Statistik.** Paul Stefan Pütter. *Annalen der Physik*, v. 19, Dec. 1956, p. 145-165.

Study of a system of spherosymmetric particles in a state of equilibrium and assumed to be governed by the law of classical physics. A statistical description was obtained by two methods; for each the general theory was deduced and a system of partial differential equations formed.

9180* (German.) Thermodynamic Analysis. **Zur thermodynamischen Analyse. IX.** A Calorimeter for Air or Gases. **Ein Luft- oder Gaskalorimeter.** Willy Oelsen. *Archiv für das Eisenhüttenwesen*, v. 28, Jan. 1957, p. 1-6.

Results given by an air calorimeter through which air was drawn, and by a calorimeter through which air and other gases were blown. Application to the heat of fusion of Pb, In, Cd, and others.

9181* (German.) Crystallographic and Magnetic Investigation of the Lead Oxide (PbO)-Iron Ooxide (Fe_2O_3) System. **Kristallographische und magnetische Untersuchungen im System Bleioxyd (PbO)-Eisenoxyd (Fe_2O_3).** Walter Berger

and Franz Pawlek. *Archiv für das Eisenhüttenwesen*, v. 28, Feb. 1957, p. 101-108.

Determination of a previously unknown compound 2 $PbO \cdot Fe_2O_3$. Measurement of magnetic energy value, remanence, coercive force, and magnetization.

9182 Fundamental Concepts of Thermodynamics. II. What Is the Meaning of Work. John L. Morrison. *Chemistry in Canada*, v. 9, Mar. 1957, p. 52 + 5 pages.

An analysis of the "work" concept in the light of recent work.

9183* (French.) Spectra Emitted in Far Ultra-Violet by Sparks in Vacuum, on Organic Supports. **Spectres émis dans l'ultraviolet lointain par des étincelles glissantes dans le vide, sur des supports organiques.** Jacques Romand and Germaine Balloffet. *Comptes Rendus*, v. 244, Feb. 4, 1957, p. 739-742.

A study of spark spectra in vacuum of organic high polymers. The carbon lines were many and strong, those of the electrode material were few. The spark mechanism was studied.

9184* (French.) Directed Congealing of Water Supercooled on a Crystalline Surface. Cases of Silver and Silver Iodide. **Congélation orientée de l'eau sur fondue sur une surface cristalline. Cas de l'argent et de l'iodure d'argent.** Jean Jaffray and Robert Montmory. *Comptes Rendus*, v. 244, Feb. 11, 1957, p. 859-861.

The supercooling of ice crystals was observed on Ag layers oriented on mica, and on crystalline surfaces of AgI prepared from oriented Ag layers.

9185* (French.) Exciton Spectra, in Absorption and Emission, in γ-AgI at Very Low Temperatures. **Spectres de l'exciton, en absorption et en émission, dans γ-AgI aux très basses températures.** Guy Perny and Serge Nikitine. *Comptes Rendus*, v. 24, Feb. 11, 1957, p. 878-881.

A study of the absorption and emission spectra of γ-AgI at 77, 20, and 4 K. Line spectra caused by excitons were shown in absorption and emission.

9186* (French.) Sound Propagation in a Variable Wind. **Propagation du son dans un vent variable.** Yves Rocard. *Comptes Rendus*, v. 244, Mar. 4, 1957, p. 1339-1341.

The existence of a positive or negative gradient of wind speed in the direction of propagation of a sound wave involves an exponentially increasing or decreasing variation of the amplitude of this wave.

9187* (Russian.) Entropy of Stochastic Processes. **Entropiia stokhasticheskikh protsessov.** M. Rozenblat-Rot. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 16-19.

Presents 17 theorems relating to the entropy of fields.

9188* (Russian.) Some Plane Problems in the Theory of Thermal Waves. **Nekotorye ploskie zadachi teorii teplovykh voln.** B. G. Korenev. *Doklady Akademii Nauk SSSR*, v. 112, Jan.-Feb. 1957, p. 29-32.

Studies of thermal waves occurring in plates of small thickness.

9189 Classical Theory on Alkali Halide Molecules. Yatendra Pal Varshni. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 132-137.

Calculations of rotational and vibrational constants, assuming inverse power and exponential types of repulsion terms in the potential energy function.

9190* (Russian.) Contribution to the Theory of Anti-Ferromagnetism. **K teorii antiferromagnetizma.** A. A. Berdyshev and Iu. A. Iziumov. *Zizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 406-410.

Theory of antiferromagnetism is usually considered for cases in which for each magnetically-active atom there is only one electron. This study considers the case for several atoms.

9191* (Russian.) Ferromagnetism of Conduction Electrons. **Ferromagnetizm elektronov provodimosti.** G. S. Krinchik. *Fizika Metallov i Metallovedenie*, v. 3, no. 3, 1956, p. 422-432.

Development of qualitative criteria of ferromagnetism, making it possible to solve some concrete problems by use of the theory of ferromagnetic metals and alloys.

9192 Matrix Analysis of Heat Transfer Problems. Louis A. Pipes. *Franklin Institute, Journal*, v. 263, Mar. 1957, p. 195-206.

Analytical method makes use of the analogy that exists between the thermal problem and the flow of electricity in an electrical transmission line. Use of matrix algebra greatly facilitates the calculation of transient and periodic heat flow in composite solids.

9193 Simple Bridge Method for the Measurement of Thermal Conductivity of Gases and Gas Mixtures. Mahendra P. Madan. *Franklin Institute, Journal*, v. 263, Mar. 1957, p. 207-212.

9194 The State Principle—Some General Aspects of the Relationships Among the Properties of Systems. S. J. Kline and F. O. Koenig. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 29-34.

An independent generalization called the "State Principle" is necessary to the logical development of thermodynamics. By use of it and certain new definitions, a derivation of the phase rule is obtained which is simple and rigorous and which requires no resort to advanced thermodynamics or to the First and Second Laws.

9195 Dispersion Relations for Tensor Media and Their Application to Ferrites. Barry S. Gourary. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 283-288.

The Kronig-Kramers integral relations between the real and imaginary parts of the susceptibility are generalized to the case where the susceptibility is a tensor and applied to plane waves propagating in an infinite ferrite medium.

9196 Electroluminescence Deterioration. W. A. Thornton. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 313-316.

Room-temperature deterioration or decay proceeds according to the relation $L=L_0/(1+t/t_{1/2})$, where $t_{1/2}$ is the time to half-intensity. Photoluminescence remains constant. Decay at 80 K proceeds at a much slower rate.

9197 Magnetic Induction and Coercive Force Data on Members of the Series $BaAl_xFe_{12-x}O_{19}$ and Related Oxides. L. G. Van Uitert. *Journal of Applied Physics*, v. 28, Mar. 1957, p. 317-319.

Evidence for the occurrence of points of magnetic compensation in the series. Anisotropy increases with Al content, causing ferromagnetic resonance to move to higher frequencies.

9198* (French.) Electroluminescence Mechanism in Zinc Sulfide. **Mécanisme de l'électroluminescence du sulfure de zinc.** R. Goffaux. *Journal de Physique et le Radium*, v. 18, Jan. 1957, p. 1-4.

A theoretical interpretation, by means of a model, of the principal phenomena occurring in phosphorescence. Changes in luminescence waves could be interpreted with a more elaborate model.

9199 The Thermodynamic Properties of 54 Elements Considered as Ideal Monatomic Gases. Harwood G. Kolsky. *Los Alamos Scientific Laboratory (U. S. Atomic Energy Commission)*, LA-2110, Mar. 1957, 138 p. (UF767 U3La Contin.)

9200* (English.) **On the Paramagnetic Resonance Spectrum of Triphenylmethyl.** P. Brovetto and S. Ferroni. *Nuovo Cimento*, v. 5, ser. 10, Jan. 1957, p. 142-153.

9201* (English.) **The Determination of the Absorption Coefficient of Luminescent Microcrystals.** Gy. Gergely. *Optica Acta*, v. 3, Dec. 1956, p. 184-188.

Emission of single modified ZnS-type microcrystals.

9202 Induced Transmission in Absorbing Films Applied to Band Pass Filter Design. Peter H. Berning and A. F. Turner. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 230-239.

9203 Refractive Indexes of Single Synthetic Zinc Sulfide and Cadmium Sulfide Crystals. S. J. Czyzak, W. M. Baker, R. C. Crane, and J. B. Howe. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 240-243.

Device for measuring refractive indexes of crystals in the visible and infra-red region utilizes thermocouples with CaF_2 or KBr windows to detect the chopped refracted beam.

9204 Infrared Refractive Indexes of Silicon, Germanium and Modified Selenium Glass. Calvin D. Salzberg and John J. Villa. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 244-246.

9205 On the Oscillator Strength of V_2 Centers in Potassium Iodide Crystals. Yoichi Uchida, Yoshio Nakai, Tosiro Tomotika. *Optical Society of America, Journal*, v. 47, Mar. 1957, p. 246-249.

Taking into account that two I atoms are associated with a V_2 center, the oscillator strength of the absorption band at 365 mμ. was estimated to be 1.10 ± 0.16 by the Smakula formula.

9206* (German.) Heat Conductivity Problems Presenting a Transference Number Variable With Time. **Wärmeleitprobleme mit zeitlich variabler Übergangszahl.** F. Selig and H. Fieber. *Österreichisches Ingenieur-Archiv*, v. 11, Jan. 1957, p. 37-40.

Plane surface heat conductivity problems having transference coefficients variable with time and a solid edge can, by means of an appropriate coordinate transformation, be changed into problems with constant coefficients of transformation and a movable edge.

9207 (English.) **Spontaneous Magnetization and Magnetic Susceptibilities of an Antiferromagnetic With Foreign Ions in Both Sublattices.** K. F. Niessen. *Philips Research Reports*, v. 12, Feb. 1957, p. 70-81.

9208 (English.) **Measurements on the Velocity of Ultrasonic Waves at Various Frequencies in Helium at 1°K.** A. Van Itterbeek, G. Forrez, and M. Teirlinck. *Physica*, v. 23, Jan. 1957, p. 63-64.

Measured sound velocity in liquid He at frequencies of 200, 500, 600, 800, and 1500 kc.

9209 Paramagnetic Resonance Spectrum of Manganese in Cubic MgO and CaF_2. W. Low. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 793-800.

9210 Position of the α and β Bands in Alkali-Halide Crystals. F. Bassani and N. Inchauspé. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 819-822.

The traditional model of the exciton is used to determine positions relative to the first maximum of the fundamental absorption bands. The β band is considered to be due to an exciton created in the immediate vicinity of an *F* center and the α band to an exciton created in the immediate vicinity of a negative-ion vacancy.

9211 Effect of Isotopes on Low-Temperature Thermal Conductivity. Glen A. Slack. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 829-831.

Thermal resistivity data for single crystals of Si, Ge, KCL, solid He, sapphire, SiO_2, KBr, and diamond.

9212 Low-Field Electroluminescence in Insulating Crystals of Cadmium Sulfide. Roland W. Smith. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 900-904.

Conductivity is induced in the insulator by injecting electrons and holes from the electrodes; electroluminescence is produced by the subsequent radiative recombination of these carriers in the bulk of the crystal.

9213 New Magnetic Anisotropy. W. H. Meiklejohn and C. P. Bean. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 904-913.

Exchange anistotropy is the result of an interaction between an antiferromagnetic material and a ferromagnetic material and is exhibited by a compact of fine particles of Co with a cobaltous oxide shell.

9214 Some *F*-Band Optical Oscillator Strengths in Additively Colored Alkali Halides. C. J. Rauch and C. V. Heer. *Physical Review*, v. 105, ser. 2, Feb. 1, 1957, p. 914-920.

The number of magnetic centers in alkali halides additively colored in the alkali vapor was determined by measuring the static magnetic susceptibility. These values may be correlated with the optical absorption of the *F* band.

9215 K X-Ray Absorption Spectrum of a Single Crystal of Germanium. D. G. Doran and S. T. Stephenson. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1156-1157.

9216 Color Centers in X-Rayed Potassium Iodide. Herbert N. Hersh. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1158-1167.

Single crystals were irradiated at room, liquid N, and liquid He temperatures. Initial effect was to lower the absorption in the long-wavelength tail of the fundamental absorption band, presumably by radiation damage of those nonequilibrium aggregates initially present in the crystal.

9217 Anisotropic Relaxation Peak in the Internal Friction of Crystalline Quartz. John H. Wasilik. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1174-1180.

Height of the loss peak increases by a factor of 2.1 between a sample stressed in the Y direction and one stressed in a direction −18.5° from the Y axis. Peak may be due to presence of Li.

9218 Approximate Wave Functions for the F Center, and Their Application to the Electron Spin Resonance Problem. Barry S. Gourary and Frank J. Adrian. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1180-1192.

The vacancy model of the F center is treated by a simplified Hartree method. The ions are treated as point charges, and potential of the lattice and hyperfine structure of the F center are calculated.

9219 Luminescence of Potassium Iodide. K. J. Teegarden. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1222-1227.

When single crystals of KI are cooled to −160 C and illuminated with light absorbed in the first fundamental band they luminesce with a quantum yield between 0.5 and 1. Excitation and emission spectra are presented.

9220 "Thickness Effect" in Absorption Spectra Near Absorption Edges. L. G. Parratt, C. F. Hempstead, and E. L. Jossem. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1228-1232.

Details of an observed absorption spectrum are shown to depend upon the thickness of the absorber. This effect is present, at least in principle, regardless of the type of radiation involved.

9221 Atomic Heats of Normal and Superconducting Thallium. J. L. Snider and J. Nicol. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1242-1246.

9222 Isotope Shifts in the Spectra of Strontium. R. H. Hughes. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1260-1261.

9223 Theory of the Hyperfine Structure of NO Molecule. Electronic Structure. Masataka Mizushima. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1262-1270.

9224 Paramagnetic Resonance Absorption in Uranium (III) Chloride and the Nuclear Spin, Magnetic Dipole Moment, and Electric Quadrupole Moment of Uranium-233. Paul B. Dorain, Clyde A. Hutchison, Jr., and Eugene Wong. *Physical Review*, v. 105, ser. 2, Feb. 15, 1957, p. 1307-1309.

9225 Principles of Engineering Heat Transfer. Warren H. Giedt. 372 p. 1957. D. Van Nostrand Co., Princeton. (QC320 G36p)

Concepts of conduction, convection, radiation, and fluid flow; physical interpretation of properties and processes.

9226* (French.) Study of a Filtering Method Applied to Optical Images. **Étude d'une méthode de filtrage des images optiques. III.** Experimental Apparatus and Restitution Examples. **Dispositif expérimental et exemples de restitution.** Paul Croce. *Revue d'Optique*, v. 35, Dec. 1956, p. 642-656.

9227* (French.) Effects of Chromatism on Diffraction Images. **Influence du chromatisme sur les images de diffraction.** Pierre Lacomme. *Revue d'Optique*, v. 36, Jan. 1957, p. 1-19.

9228 On Reaction in the Solid State. G. I. Finch and K. P. Sinha. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 145-153.

Using the concept of phonon-lattice interaction, an expression is derived for the minimum temperature of a solid at which it may enter into solid-state reaction. Crystallographic phase transformations and the formation of transitional superstructures constitute the phase-boundary processes. Kinetics are governed by the dynamics of the diffusion process.

9229 An Optical Method of Studying the Diffraction From Imperfect Crystals. I. Modulated Structures. II. Crystals With Dislocations. B. T. M. Willis. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 184-201 + 5 plates.

The correspondence between the X-ray diffraction pattern of a crystal and the optical diffraction pattern of a two-dimensional grating was used to determine the nature of the diffraction from imperfect crystals.

9230 Electron and Lattice Conduction in Metals. I. I. Hanna and E. H. Sondheimer. *Royal Society, Proceedings*, v. 239, ser. A, Feb. 26, 1957, p. 247-266.

Theory of the transport phenomena; transport equations; electrical and thermal conductivity; thermoelectric power.

9231 Review of Experimental Investigations of Liquid-Metal Heat Transfer. Bernard Lubarsky and Samuel J. Kaufman. *U. S. National Advisory Committee for Aeronautics, Report* 1270, 1956, 33 p. (TL521 Un3r Vis.)

An equation based on empirical grounds, which best represents most of the fully developed heat-transfer data, is $Nu=0.625\ Pe^{0.4}$ where Nu and Pe represent Nusselt number and Peclet number, respectively.

9232* (German.) Study of Highly-Dissociated Gases. **Zur Kenntnis stark dissoziierter Gase.** Eberhard Büchner and Reinhold Strobel. *Zeitschrift für Flugwissenschaften*, v. 5, Feb. 1957, p. 33-43.

The enthalpy and entropy difference from the selected zero position at 2000 K and a pressure of 1 kg. per sq. cm. are calculated for H.

See also: **7864** (soundproofing of aircraft cabins); **8002** (properties of Mn-Cu-Mn-Al ferrites); **8429** (speech synthesizer); **8486** (electrical properties of HgSe-HgTe films); **8598** (magnetic recording on film); **8641** (mirrors for solar furnaces); **8652** (heat transfer in cooling equipment); **8894** (hardness of diamonds).

PLASTICS

9233* The Identification of Nylon and Related Polymers by Paper Chromatography. M. Clasper, J. Haslam, and E. F. Mooney. *Analyst*, v. 82, Feb. 1957, p. 101-107 + 2 plates.

After hydrolysis of the sample with acid, solution is evaporated to dryness and the products dissolved in ethanol and separated by paper chromatography. Products are identified by observation of the chromatogram under ultra-violet light and by using ninhydrin and methyl red–borate buffer solutions as spray reagents.

9234* (German.) Synthetic Macromolecular Substances With Reactive Groups. **Synthetische makromolekulare Stoffe mit reaktiven Gruppen.** W. Kern and R. C. Schulz. *Angewandte Chemie*, v. 69, Mar. 7, 1957, p. 153-171.

Synthesis, properties, and reactions of macromolecular substances such as derivatives of polyacrylic acid, polyvinyl alcohol, polyacrolein and polymethacrolein, polyvinyl sulfonic acid and their derivatives, and copolymers of styrene and maleic anhydride.

9235 Measurement of Cure Rate of Thermosetting Molding Materials. A. J. Guzzetti. *ASTM Bulletin*, no. 220, Feb. 1957, p. TP45-TP54.

The cure speeds of thermosetting materials may be estimated from the rigidity of hot molded pieces immediately upon discharge from the mold, with results expressed as an apparent modulus of elasticity.

9236 Accelerated Fatigue of Plastics. Lawrence S. Lazar. *ASTM Bulletin*, no. 220, Feb. 1957, p. TP55-TP60.

The Prot Progressive Loading Method appears to be a promising accelerated technique for determining fatigue limits.

9237 Casting Resin Applications in Electronic Equipment. K. A. Fletcher. *British Plastics*, v. 30, Mar. 1957, p. 90 + 5 pages.

Resin properties; production problems; polyurethane; protection of valve circuits; weathering of casting resins; high-voltage applications; thermal shock; assembly problems; mold design; electrical properties.

9238 Plastics and Radioactive Metallography. E. C. Sykes. *British Plastics*, v. 30, Mar. 1957, p. 95-98.

Effect of irradiation on ten plastics materials. Details of uses in a Harwell installation for the examination of specimens of up to ten curies of γ radiation.

9239 An Appraisal of the Izod Impact Test for Plastics. C. E. Stephenson. *British Plastics*, v. 30, Mar. 1957, p. 99-104.

Effects of clamping pressure, striking at an angle, and specimen pressure on impact strength of "Perspex". Energy for crack initiation and propagation.

9240* Developments in Polyethylene Insulation. Alex E. Javitz. *Electrical Manufacturing*, v. 59, Mar. 1957, p. 108 + 14 pages.

A comprehensive account of the new types of polyethylene, standard materials, and design and application potentials.

9241 The Thermal Depolymerization of Polystyrene. I. The Reaction Mechanism. N. Grassie and W. W. Kerr. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 234-239.

The initial steep fall in mol.wt. is due to a disproportionation reaction occurring at "weak links" in the polymer chains and results in stable molecules. Volatile products are liberated in a radical reaction initiated exclusively at chain ends and having a kinetic chain length of the order of 10^3.

9242 Studies in Chain-Transfer. II. Catalyzed Polymerization of Methyl Methacrylate. R. N. Chadha, J. S. Shukla, and G. S. Misra. *Faraday Society, Transactions*, v. 53, Feb. 1957, p. 240-246.

9243 Fibres, Plastics, and Rubbers. A Handbook of Common Polymers. W. J. Roff. 400 p. 1956. Academic Press, New York. (TS1548 R62f)

Extensive chemical, physical, and general information on the common high polymers. Intended essentially for those engaged in industrial research and development.

9244 Plastics and Elastomers for Use in Radiation Fields. I. Effects of Gamma Irradiation. Robert Harrington. *Hanford Atomic Products Operation (U. S. Atomic Energy Commission)*, HW-44092, Nov. 1956, 41 p. (UF767 Un3.1hw Contin.)

Results from exposure of 48 plastics and elastomeric materials over a dose range of 3×10^6 to 9×10^7 r. A styrene-butadiene rubber (PR 408-70) appeared to be the least affected. Two acrylic and two vinyl chloride materials were almost as good.

9245* Discoloration of Polystyrene Shields: Its Cause and Solution. John B. Orr. *Illuminating Engineering*, v. 52, Mar. 1957, p. 133-136.

Discoloration is apparently proportional to the intensity of ultraviolet radiation throughout the thickness of the polystyrene material.

9246 Unplasticized P.V.C. as a Constructional Material in Chemical Engineering. II. S. Mottram and D. A. Lever. *Industrial Chemist*, v. 33, Mar. 1957, p. 123-128.

Chemical resistance of unplasticized PVC, compounding techniques, methods of extruding tube, and preparation of sheet materials. (To be continued.)

9247 Pyromellitic Dianhydride in Curing of Epoxy Resins. R. B. Feild and C. F. Robinson. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 369-373.

Epoxy resins cured by pyromellitic dianhydride mixtures have exceptionally high heat-distortion temperatures. Physical and electrical properties are good and chemical resistance excellent.

9248 Permeation, Diffusion, and Solubility of Methyl Bromide and Isobutene in Polyethylene. Igor Sobolev, J. A. Meyer, Vivian Stannett, and Michael Szwarc. *Industrial and Engineering Chemistry*, v. 49, pt. 1, Mar. 1957, p. 441-444.

9249* (Russian.) Redox Systems for Initiating Radical Processes. **Okislitel'no-vosstanovitel'nye sistemy dlia initsiirovaniia radikal'nykh protsessov. II.** Initiation of Polymerization in Emulsions by Reversible Systems at Temperatures Below O C, and Study of Polymer Chain Structures. **Initsiirovanie polimerizatsii v vodnykh emul'siiakh pod vliianiem obratimykh sistem, pri temperature nizhe O° i izuchenie mikrostruktury polimernoi tsepi.** G. P. Belonovskaia, B. A. Dolgoplosk, and E. I. Tiniakova. *Izvestiia Akademii Nauk SSSR, Otdelenie Khimicheskikh Nauk*, no. 1, Jan. 1957, p. 65 + 4 pages + 1 plate.

Shows that it is possible to use a system containing dienols, hydrogen peroxides, and iron salts to initiate polymerization at temperatures down to −47 C. Connection between temperatures of polymerization of divinyl and isoprene; microstructures of the polymer chains.

9250 Some Characteristics of Epoxide Resin Systems. F. J. Allen and W. M. Hunter. *Journal of Applied Chemistry*, v. 7, Feb. 1957, p. 86-96.

Hardening of epoxide resins with amines and methods of modifying polyfunctional aliphatic amines to widen their range of application. Effects of time and temperature of curing of epoxide resin-amine systems.

9251 Calculation of Compressibilities of High Polymers From the Energy of Interaction Between Chain Groups. Werner Brandt. *Journal of Chemical Physics*, v. 26, Feb. 1957, p. 262-270.

9252 Dynamic Mechanical Properties of Polyethyl Methacrylate. John D. Ferry, William C. Child, Jr., Robert Zand, Donald M. Stern, Malcolm L. Williams, and Robert F. Landel. *Journal of Colloid Science*, v. 12, Feb. 1957, p. 53-67.

Measurements between 24 and 2400 c.p.s. in the temperature range from 75 to 155 C for two fractions of polyethyl methacrylate of weight-average molecular weights 1.73 X 10^6 and 0.164 X 10^6.

9253* (English and French.) **Symposium on Macromolecules. I-II.** *Journal of Polymer Science*, v. 23, Jan. 1957, 511 p.; Feb. 1957, p. 513-965.

Includes papers on the general behavior of biocolloids and polyelectrolytes in solution, and on special polymeric systems in solution.

9254 Glassy State Transitions of Poly-(Chlorotrifluoroethylene), Poly-(Vinylidene Fluoride), and Their Copolymers. L. Mandelkern, G. M. Martin, and F. A. Quinn, Jr. *Journal of Research, National Bureau of Standards*, v. 58, Mar. 1957, p. 137-143.

Glass transition temperatures were determined using dilatometric and interferometric methods. Values for poly-(chlorotrifluoroethylene) and poly-(vinylidene fluoride) were 45 and −35 C, respectively. Temperatures for the copolymers were between these points. The results indicate that the glass temperature of a copolymer is a monotonic function of its composition. Evidence for the effect of crystallization on glass temperature of a hemopolymer is contradictory, but experiments showed that the crystallization of one type of unit in a random copolymer results in a shift in the glass temperature in the direction of higher compositions of the noncrystallizing component.

9255* (German.) Plastics and Their Use in the Packaging of Foodstuffs. **Kunststoffe in der Lebensmittelverpackung.** L. Robinson-Gornhardt. *Kunststoffe*, v. 47, Feb. 1957, p. 54-58.

Literature survey dealing with toxic and non-toxic plastic materials, compounding ingredients, and other additives.

9256* (German.) The Determination of Volatility and Migration of High Molecular Weight Plasticizers. **Flüchtigkeits-und Migrationsbestimmung einfacher und hochmolekularer Weichmacher.** A. Merz. *Kunststoffe*, v. 47, Feb. 1957, p. 69-73.

The "active charcoal" method of determining plasticizer volatility. Composition of contact material is important in determining migration.

9257* (German.) Forming of Rigid PVC Sheet. **Verformen von PVC-Hartfolien.** Heinz Oelze. *Kunststoffe*, v. 47, Feb. 1957, p. 93-98.

Forming machines are described. Subsequent operations, such as embossing and sealing, decisively influence the economics of the process.

9258* (German.) High Molecular Weight Ester Plasticizers; Classification, Composition, Examination, and Technological Properties. **Hochmolekulare Ester-Weichmacher. Einteilung, Zusammensetzung, Prüfung und technologische Eigenschaften.** K. Zöhrer and A. Merz. *Kunststoffe*, v. 47, Mar. 1957, p. 102-113.

9259 Factors Affecting Quality in Polyethylene Extrusion. B. H. Maddock. *Modern Plastics*, v. 34, Apr. 1957, p. 123 + 13 pages.

The product of shear rate and dwell time, or the amount of shear, may be a fundamental factor governing thoroughness of mixing. In general, extrusion quality is improved by increasing the back pressure, stock temperature, or amount of mechanical work per lb. of plastic.

9260 Volume and Pressure Effects in Compression Molding. II. W. R. McGlone and L. B. Keller. *Modern Plastics*, v. 34, Apr. 1957, p. 137 + 5 pages.

In a landed mold, high effective pressure on a part throughout the molding cycle does not alone insure a non-porous structure. The use of slow closing times, dwelling and bumping or preheating of material may be required to produce non-porous parts. Low effective pressure considerably increases the probability of porosity.

9261 Theoretical Study of Polyethylene Permeability. Jules Pinsky. *Modern Plastics*, v. 34, Apr. 1957, p. 145 + 6 pages.

Data is based on an extensive study of the effect of 80 chemicals on three available commercial polyethylenes, two experimental polyethylenes, and an irradiated commercial polyethylene.

9262* (Dutch.) Technical Melamine Molding Powders. **Technische melamine-persmassa's.** F. Weber. *Plastica*, v. 10, Mar. 1957, p. 153-157.

Improving properties by using special fillers such as glass fibers, textiles, cellulose, asbestos, or various powders.

9263 Pressure Preforming. S. H. A. Young. *Plastics*, v. 34, Mar. 1957, p. 161 + 4 pages.

A one-step preforming process makes precision preforms of sharply varying cross section quickly and without waste.

9264 Volume and Pressure Effects in Compression Molding. I. W. R. McGlone and L. B. Keller. *Plastics*, v. 34, Mar. 1957, p. 173 + 5 pages.

Behavior of materials in molds. Punch travel studies.

9265 Temperature-Property Relations in Melamine- and Silicone-Glass Fabric Laminates. William N. Findley, Harlan W. Peithman, and Will J. Worley. *Plastics*, v. 34, Mar. 1957, p. 185 + 10 pages.

Results of static tension, static compression, tension creep, and time-to-fracture tests at temperatures up to 400 and 600 F respectively.

9266 Design for Better Calendering. Kendrick J. Gooch. *Plastics Technology*, v. 3, Mar. 1957, p. 187 + 4 pages.

Important design features that should be considered in order to minimize calender obsolescence.

9267 Load-Deflection Properties of Glass- Reinforced Plastic Laminates Under Rapid Heating. J. H. Beno, E. F. Smith, and A. M. Dowell. *Plastics Technology*, v. 3, Mar. 1957, p. 203 + 4 pages.

Plastic deformation may be eliminated either by a flash cure, or by a postcure at temperatures higher than those that will be encountered by the part during service.

9268 The Nature of the Initiation Reaction in the Polymerization of Styrene Sensitized by Benzoyl Peroxide. J. C. Bevington. *Royal Society, Proceedings*, v. 239, ser. A, Mar. 12, 1957, p. 420-432.

9269* New Gating for Acrylics. J. F. Moore. *SPE Journal*, v. 13, Mar. 1957, p. 17 + 4 pages.

"Tab gating" is the use of a tab or vestibule in place of the usual gate. Molten plastic enters the tab from the side through a restricted entrance. Advantages can include lower mold cost and better physical properties in the molded part.

9270* Controlling Effects of Moisture on Molded Nylon. W. B. Happoldt, A. J. Cheney, and E. M. Lacey. *SPE Journal*, v. 13, Mar. 1957, p. 21 + 5 pages.

Possible conditioning techniques include boiling in water to partial saturation, heating in a salt solution such as potassium acetate and water, or subjecting to superheated steam either at atmospheric conditions or under pressure.

9271* The Molding of Thick Polyester Laminates. Finn Claudi-Magnussen. *SPE Journal*, v. 13, Mar. 1957, p. 36 + 3 pages.

Internal delamination of thick glass-polyester laminates results from a too-short molding cycle and from too-high internal temperatures. Quantitative studies of these factors lead to recommended molding procedures to produce void-free thick laminates.

9272* (Swedish.) Ionizing Radiation and High Polymer Chemistry. **Joniserande strålning och högpolymerkemi.** Per-Olof Kinell. *Svensk Kemisk Tidskrift*, v. 69, no. 1, 1957, p. 17-33.

A general survey of the physical and chemical phenomena involved in ionizing radiation and the application of such radiation to high polymers.

9273* Studies in the Gas and Vapor Permeability of Plastic Films and Coated Papers. III. The Permeation of Mixed Gases and Vapors. J. A. Meyer, C. Rogers, V. Stannett, and M. Szwarc. *Tappi*, v. 40, Mar. 1957, p. 142-146.

Plastic films were measured for N, O, and He permeability with and without CO_2.

9274* (German.) Polyethylene Plastic Pipes. **Polyäthylen-Plastikrohre.** W. Köhler. *Werkstoffe und Korrosion*, v. 8, Feb. 1957, p. 69-73.

Presents a general and up-to-date survey of the commercial types and their dimensions; physical properties and corrosion behavior.

9275* (German.) Degradation of Polymethacrylic Acid Methyl Ester in Solution by ^{60}Co Gamma Rays. An Example of Transformation of Energy During Radiochemical Reaction. **Die Zersetzung des Polymethacrylsäuremethylesters in Lösung unter dem Einfluss von ^{60}Co-Gamma-Strahlen: Ein Beispiel für die Energie-Übertragung bei strahlenchemischen Reaktionen.** Arnim Henglein, Martin Boysen, and Wolfram Schnabel. *Zeitschrift für Physikalische Chemie (Frankfurt)*, v. 10, Feb. 1957, p. 137-155.

A study of the degradation of polymethylmethacrylate by means of Co^{60} gamma rays in solutions containing DPPH (α, α-diphenyl-β-picryl-hydrazyl) or iodine which are known to combine very easily with radicals.

See also: **8291** (plastic coatings for steel); **8310** (plastic coatings); **8360** (plastics in electric equipment); **8374** (plastic insulation for electric cables); **8377** (plastic electrical insulation); **8491** (Canadian plastics industry); **8534** (permeability of plastic film); **8689** (properties of glass-fiber reinforced plastic laminates); **9338** (polyethylene coatings).

POLLUTION AND WASTES

9276* (Spanish.) Electrostatic Dust Elimination. **Separación electrostática de polvo.** A. Frauenfelder. *Acero y Energia*, v. 14, Jan.-Feb. 1957, p. 63-69.

Only the electrostatic method is 99 to 100% effective in eliminating dust from gases. Gives a description of the method, apparatus, applications, and usual results.

9277* Anaerobic Digestion of Algae. C. G. Golueke, W. J. Oswald, and H. B. Gotaas. *Applied Microbiology*, v. 5, Jan. 1957, p. 47-55.

Best digester performance is obtained at 50 C with a detention period of 11 to 30 days. Under normal conditions, each pound of algal volatile matter introduced into a digester will yield approximately 8 cu. ft. of gas, of which approximately 2.5 cu. ft. will be CO_2; 5.0 cu. ft. methane; and 0.5 cu. ft. will be H, N, and other gases.

9278* Gaseous Contaminants in the Atmosphere. Jacob Cholak, Lawrence J. Schafer, David Yeager, and Waldo J. Younker. *Archives of Industrial Health*, v. 15, Mar. 1957, p. 198-206.

Concentrations of oxidant, NO_2, SO_2, and CO in the air were measured in Cincinnati during prolonged tests during three seasons of the year.

9279* (French.) Treatment System for Liquid Radioactive Wastes. **Traitement des eaux résiduaires radioactives.** P. Dejonghe. *Centre Belge d'Etude et de Documentation des Eaux, Bulletin Mensuel*, no. 73, Jan. 1957, p. 4-11.

Belgian methods used in treating radioactive liquid wastes by chemical, physiochemical or biological processes, and by disposal in the sea or underground.

9280* Research Shows Effect of Crystal Seeding by Return Sludge. S. D. Faust and H. E. Orford. *Industrial Wastes*, v. 2, Mar.-Apr. 1957, p. 36-41.

Sludges resulting from lime neutralization of dilute H_2SO_4 solutions can be concentrated by addition of return sludge to the acid before neutralization. Native gypsum powder improves the seeding characteristics of return sludge.

9281* Eliminating Acid Disposal in Metal Cleaning Operations. Eugene F. Anderson. *Industrial Wastes*, v. 2, Mar.-Apr. 1957, p. 52-54.

Airless abrasive blast cleaning has many advantages over the chemical method.

9282* The Cost in Britain of Air Pollution From Different Types of Source. R. S. Scorer. *Institute of Fuel, Journal*, v. 30, Mar. 1957, p. 110-123.

Five independent factors which determine how damaging the pollution will be are estimated for seven main classes of fuel consumers.

9283 Radioactive Tracer Study of Sewage Field in Santa Monica Bay. Ralph L. Ely, Jr. *Institute of Radio Engineers, Transactions on Nuclear Science*, v. NS-4, Mar. 1957, p. 49-50. (TK1 In6.6ns Contin.)

Radioactive isotopes were successfully used to trace dispersion of sewage effluent in ocean water.

9284 Head Loss in Flow Through a Cyclone Dust Separator or Vortex Chamber. H. E. Weber and J. H. Keenan. *Journal of Applied Mechanics*, v. 24, Mar. 1957, p. 16-21.

Comparisons of experimental and analytical data indicate that for relatively large ratios of inlet area to exhaust area a momentum analysis omitting all friction forces gives a good representation of the head loss in a cyclone separator.

9285 Summary of Analytical Results From the HASL Strontium Program to June 1956. John H. Harley, Edward P. Hardy, Jr., George A. Welford, Ira B. Whitney, and Merril Eisenbud. *New York Operations Office (U. S. Atomic Energy Commission)*, NYO-4751, Rev., Aug. 1956, 36 p. (UF767 U3ny Contin.)

A report on the documentation of fallout and the monitoring of the Sr^{90} level in various materials at a few selected sites.

9286 Notes on Fission Product Wastes From Proposed Power Reactors. F. L. Culler, Jr. *Oak Ridge National Laboratory (U. S. Atomic Energy Commission)*, CF-55-4-25, Mar. 1955, 31 p. (UF767 Un3.1cf Contin.)

Types of reactors; types of wastes; processing methods; proposed methods for ultimate disposal.

9287* (Finnish.) Waste Water Questions of the Woodworking Industries. **Träförädlingsindustrins avfallsvattenfrågor.** Harald Tötterman. *Paperi ja Puu*, v. 39, Jan. 1957, p. 9-18.

A number of abstracts of lectures on European waste water problems in the pulp and paper and other woodworking industries.

9288* (English.) **Sewage Pumping Stations. A Review of Practical Experience.** A. Gubelmann and J. Sprecher. *Sulzer Technical Review*, v. 38, no. 3, 1956, p. 11-24.

Problems raised by inhomogeneity of liquid wastes are discussed.

9289* New Design to Concentrate Calcium and Ammonia-Base Liquors Without Scaling. Hans Svanoe. *Tappi*, v. 40, Mar. 1957, p. 152-156.

In test runs, the spent liquor was concentrated in one step to about 50% solids.

See also: **7928** (agricultural use of cannery wastes); **7949** (bacterial aerosols); **8029** (recovery of SO_2 from flue gases); **8048** (Rohmann electrostatic particle separator).

RUBBER AND ELASTOMERS

9290 Engineering Uses of Rubber. A. T. McPherson and Alexander Klemin, editors. 490 p. 1956. Reinhold Publishing Corp., New York. (TS1890 M24e)

Intended particularly for engineers outside the rubber industry, this book covers the making of rubber goods, properties and behavior of rubber, applications in different industries including tires and belt conveyors, and means of obtaining rubber products for special purposes.

9291* Carbon-Black Loaded Rubber Vulcanisates: Volume Changes in Stretching. L. Mullins and N. R. Tobin. *Institution of the Rubber Industry, Transactions*, v. 33, Feb. 1957, p. 2-10.

An investigation of crystallization which accompanies the extension of natural rubber. Effect of previous extension on these changes is interpreted in terms of a simple model describing the stress-strain properties of reinforced vulcanizates.

9292 Application of Ree-Eyring Generalized Flow Theory to Suspensions of Spherical Particles. II. Flow in Low Shear Region. Samuel H. Maron and Arthur W. Sisko. *Journal of Colloid Science*, v. 12, Feb. 1957, p. 99-107.

Theory was applied to data on the flow behavior of X-667 synthetic latex at low rates of shear in both the Newtonian and non-Newtonian regions. A Newtonian water unit and two latex flow units of different relaxation times were required.

9293 Some Aspects of the Vulcanization of Rubber by Irradiation. A. S. Kuzminskii, T. S. Nikitina, and V. L. Karpov. *Journal of Nuclear Energy*, v. 4, Feb. 1957, p. 268-272. (Translated from *Atomnaya Energiya*, v. 1, no. 3, 1956, p. 137.)

Vulcanization of natural rubber (NK), butadiene-styrene (SKS-30), butadiene (SKB-40), and nitrile (SKN-26). Changes in relative density, structure, and strength as a function of total irradiation dose. The specific role of various types of carbon black.

9294 An Extensometer Microscope Stage for Photoelastic Studies in Rubber. E. H. Andrews. *Journal of Scientific Instruments*, v. 34, Mar. 1957, p. 115-117.

9295* (German.) Thermal Vulcanization of Buna. **Beitrag zur Thermovulkanisation von Buna.** H. Luttropp. *Kautschuk und Gummi*, v. 10, Feb. 1957, p. WT31-WT39.

Sulfur-free vulcanization of various types of Buna. Comparison with vulcanizates of natural rubber. Studies of mixtures of sulfur- and thermally-vulcanized Buna.

9296 Compare Today's Synthetic Rubbers. Harry L. Fisher. *Petroleum Refiner*, v. 36, Mar. 1957, p. 148-153.

How all the well known types are made, how they differ, and where they perform best.

9297 The Compounding of Transparent Rubber. II. Styrene-Butadiene, Nitrile, Butyl and Neoprene Rubbers. Ralph F. Wolf. *Rubber Age*, v. 80, Mar. 1957, p. 1007-1018.

Physical properties of various rubber compounds cured by different methods.

9298* Curing Systems for Improved Aging Resistance of Rubber Vulcanizates. I. Z. T. Ossefort, R. F. Shaw, and E. W. Bergstrom, Jr. *Rubber World*, v. 135, Mar. 1957, p. 867-875.

Long-term atmospheric and shelf aging and the accelerated aging of unstressed rubber vulcanizates indicates that choice of curing system is most important for obtaining superior age resistance. (To be continued.)

9299* Factors Affecting Laboratory Cut-Growth Resistance of Cold SBR Tread Stocks. E. Evertt Auer, Kenneth W. Doak, and Irwin J. Schaffner. *Rubber World*, v. 135, Mar. 1957, p. 876-885.

Establishes new relations between the laboratory crack-growth resistance of styrene-butadiene rubber vulcanizates and their modulus and breaking elongation.

See also: **8377** (rubber electrical insulation); **9243** (rubber handbook); **9244** (radiation effects on rubber).

SPACE HEATING AND CONDITIONING

9300 Components of High Temperature Water Systems. Owen S. Lieberg. *Air Conditioning, Heating and Ventilating*, v. 54, Mar. 1957, p. 79-87.

Combustion controls, distribution piping, system circulation pumps, and control valves.

9301 Ventilation and Air Conditioning at the Magma Mine. Bruce Short. *Mining Engineering*, v. 9, Mar. 1957, p. 344-348.

The seasonal mining operation schedule is described.

9302* How to Design for Liquid Nitrogen. Robert M. Gage and Paul E. Loveday. *Refrigerating Engineering*, v. 65, Mar. 1957, p. 60 + 7 pages.

Chemical inertness plus ready availability are advantages in use of liquid N for refrigeration purposes.

9303* (English.) **A Sulzer Meat Refrigerating Plant in Switzerland.** Wilhelm Gysin. *Sulzer Technical Review*, v. 38, no. 3, 1956, p. 25-29.

New methods which make for economy of production while improving the quality of the meat and tinned meat products.

9304* Progress in Refrigerants. I. William A. Pennington. *World Refrigeration and Air-Conditioning*, v. 8, Feb. 1957, p. 85-91.

A brief history of the last 50 yrs. (To be continued.)

9305* Humidity Control in Cooler Rooms Refrigerated With Brine Coils. Phillip J. Morrissey. *World Refrigeration and Air-Conditioning*, v. 8, Feb. 1957, p. 101-103.

TEXTILES, FIBERS, LEATHER, AND PAPER

9306 The Esterification of Cellulose With Methanesulfonyl (Mesyl) Chloride. Richard W. Roberts. *American Chemical Society, Journal*, v. 79, Mar. 5, 1957, p. 1175-1178.

Preparation of a trisubstituted mesylcellulose from cotton linters, a small portion of the total substitution being due to chlorine. Activation of the cellulose by mercerization was most effective when excess alkali was removed by washing with methanol rather than water. An optimum temperature of about 28 C was found for mesylation.

9307* Far-Infrared for Textile Finishing. W. L. Thomson. *American Dyestuff Reporter*, v. 46, Mar. 25, 1957, p. P171-P175.

Far-infrared heaters have proved quite economical.

9308* The Application of Colorants to Glass Fiber Textiles. R. F. Caroselli. *American Dyestuff Reporter*, v. 46, Mar. 25, 1957, P195-P198.

Various resin pigment systems and their effects on the soil resistance, fire-proofness, washfastness, lightfastness, sewability, wrinkle recoverability, abrasion resistance, appearance, and general performance of glass decorative fabrics; the Coronizing process.

9309* A Century of Progress in the Development of Colorfastness Test Methods for Textiles. M. L. Staples. *American Dyestuff Reporter*, v. 46, Mar. 25, 1957, P199-P211.

Comprehensive review.

9310 Physical Properties of Leather Fatliquored at Different Oil Levels. Victor Mattei and William T. Roddy. *American Leather Chemists Association, Journal*, v. 52, Mar. 1957, p. 110-123.

Tests of tongue tear, stitch tear, tensile strength, elongation component, needle puncture, and hardness.

9311 Flexibility Gauge. Alfred W. Hopton. *American Leather Chemists Association, Journal*, v. 52, Mar. 1957, p. 124-141.

Usefulness of this is simple, rugged, and portable instrument for measuring the flexibility and resiliency characteristics of

both light and heavy leathers is illustrated by data obtained on a wide variety of leathers.

9312 Influence of Temperature on the Reaction of a Chrome Tanning Solution With Calfskin Squares. Joseph R. Kanagy. *American Leather Chemists Association, Journal*, v. 52, Mar. 1957, p. 142-156.

Under all conditions the amount of chromic oxide retained at 50 C was 3 to 4 times greater than that retained at zero degrees C. Addition of formic acid decreased the amount retained at all temperatures.

9313* A Textbook of Corrugated Box Production. LII. Finishing; the Taping Operation. *Boxboard Containers*, v. 75, Mar. 1957, p. 33-36.

Automatic and semi-automatic taping equipment and its operation. Specialty considerations. Bundling the boxes.

9314 Some Applications of Physics to Wood. R. F. S. Hearmon. *British Journal of Applied Physics*, v. 8, Feb. 1957, p. 49-58.

A review of hygroscopic, thermal, electrical, and elastic properties. Vibration behavior is also considered, with special reference to the effect of shear and rotatory inertia in flexural vibration, and to the connection between frequency of vibration and elastic stability.

9315 Fading and Tendering Activity in Anthraquinonoid Vat Dyes. I. Electronic Absorption Spectra of Dye Solutions. II. Fluorescence, Absorption Spectra, and Stability to Light of Dyed Films. III. Free-Radical Production and Probable Reaction Mechanisms. J. J. Moran and H. I. Stonehill. *Chemical Society, Journal*, Feb. 1957, p. 765-795.

9316* Colour Index. v. I. 2nd Ed. 1809 p. 1956. The American Association of Textile Chemists and Colorists, Lowell, Mass. (TP897 So13c2 Ref.)

Hue description, commercial names, usage, and fastness properties of acid, mordant, basic, disperse, food, and leather dyes, and natural dyes and pigments.

9317 The Biological Aspects of Attack on Creosoted Wood by Limnori. Carolyn Beckman, R. J. Menzies, and C. M. Wakeman. *Corrosion*, v. 13, Mar. 1957, p. 162t-164t.

Data show relationship of treated to untreated samples with regard to animal size, population density, and reproduction capabilities.

9318 Wood—Fabrication Into a Uniform Material. *Corrosion Technology*, v. 4, Mar. 1957, p. 92-94.

Manufacture, properties, and applications of "BH Permali", a homogeneous beech wood product which retains the mechanical strength of the natural cellulose fibers, enhanced by densification.

9319* Wood Particle Molding. Allen L. Midyette. *Forest Products Journal*, v. 7, Jan. 1957, p. 1-6.

The molding process; requirements for its application to various products; relation of process variables to properties; economics; equipment; finishing operations.

9320* The Effect of Dryer Temperatures Upon the Gluing Properties of Douglas-Fir Veneer. P. L. Northcott. *Forest Products Journal*, v. 7, Jan. 1957, p. 10-16.

Reduced bond quality resulted from excessively severe drying schedules, but is attributed to reduced strength of the wood rather than to reduced adhesion.

9321* Identifying Synthetic Fibers by Micro-Fusion Methods. Donald G. Grabar and Rita Haessly. *Modern Textiles Magazine*, v. 38, Mar. 1957, p. 41 + 3 pages.

Scheme is based upon the melting point of the fiber, the eutectic temperature of the fiber with p-nitrophenol as a reference compound, and the characteristic behavior observed during heating and cooling.

9322* Schreiner Calendering of Nylon Tricot. Graham M. Richardson. *Modern Textiles Magazine*, v. 38, Mar. 1957, p. 72-76.

Process gives a matter or frosty subdued appearance suggestive of a woven rather than a knit construction.

9323* (Finnish.) Conversion of the Concentrated Sulfite Waste Liquor Into a Water-Insoluble Gel. **Väkevöidyn sulfiittijäteliuoksen saattaminen veteenliukenemattomaan geelitilaan.** Erkki Aaltio and R. H. Roschier. *Paperi ja Puu*, v. 39, no. 2, 1957, p. 29 + 4 pages.

Effects of concentration, acidity, sugar content, dichromate added, and reaction rate.

9324* (English.) **Investigations on Extract of Wood and Sulphite Pulp Made From Picea Excelsa.** Seppo K. Kahila. *Paperi ja Puu*, v. 39, no. 2, 1957, p. 35 + 8 pages.

An analysis of ether extracts of wood, stored for 4, 8, and 24 months, and also of ether extracts of sulfite pulps cooked from the same woods.

9325* The PAPRIC Electronic Dirt Counter. J. E. Tasman and S. M. Chapman. *Pulp and Paper Magazine of Canada, Convention Issue*, v. 58, 1957, p. 187 + 8 pages.

Twelve instruments using a photoelectric cell to assess dirt content of paper were evaluated.

9326* The Aquatel—A New Moisture Meter for Paper. J. A. Hart and W. Gallay. *Pulp and Paper Magazine of Canada, Convention Issue*, v. 58, 1957, p. 195-200.

Device is based on relationship between electrical conductivity and moisture content.

9327* The "H" Factor. A Means of Expressing Cooking Times and Temperatures as a Single Variable. K. E. Vroom. *Pulp and Paper Magazine of Canada, Convention Issue*, v. 58, 1957, p. 228-231.

The H factor can be employed as a means of predicting compensating adjustments of coking times and temperatures to give the same degree of pulping with widely varying coking cycles.

9328* X-Ray Analytical Techniques in Pulp and Paper Research. D. Harper. *Pulp and Paper Magazine of Canada, Convention Issue*, v. 58, 1957, p. 271 + 6 pages.

Diffraction and fluorescence theories; apparatus and applications; determination of Mo in stainless steels, S in legnin, and Fe in pulps.

9329* Comparison of Bases Used in Sulphite Pulping. I. R. K. Strapp, W. D. Kerr, and K. E. Vroom. *Pulp and Paper Magazine of Canada, Convention Issue*, v. 58, 1957, p. 277-283.

Although yield was not affected by the various bases, Na and NH_4 bases produced significantly greater delignification for equivalent yields, and reduced tailings more effectively than did Ca and Mg bases. The greatest removal of pentosan was accomplished by Mg base, while the highest viscosities were obtained with Na-base pulps.

9330* Pulp and Paper Manufacture, Bibliography, 1951-1955. Jack Weiner, compiler. 1201 p. 1957. Technical Association of the Pulp and Paper Industry, New York. (TS1080 P96)

Covers books and periodical articles for the years 1951 through 1955, divided into some 125 sections.

9331* The Vegetable Tannage of Sheepskins. A Systematic Study of Various Factors in the Tanning Process. II. Chemical Analyses, Manual Assessments, and Darkening of the Leathers on Exposure to Light. M. F. Chambers, R. G. Mitton, and E. F. Nattrass. *Society of Leather Trades' Chemists, Journal*, v. 41, Feb. 1957, p. 48-59.

Higher degrees of tannage were obtained with mimosa than with chestnut liquors, and by use of liquors with higher tan content; darkening during exposure to light was assessed.

9332 Starch and Starch Products in Paper Coating. J. P. Casey and T. Schoch, editors. Tappi Monograph Series-No. 17. 175 p. 1957. Technical Association of the Pulp and Paper Industry, New York. (TS1080 T22tm Vis.)

Consists of 15 papers which reviews technology of this field from 1947 to the present time.

9333* (English.) **The Utilization of Bark. I. Index to Bark Literature.** J. E. Marian and A. Wissing. *Svensk Papperstidning*, v. 60, Feb. 28, 1957, p. 124-127.

Constitution and properties of tannins and extracts.

9334* A New Concept in Paper Sizing—Oil Repellent Size. John H. Ernlund. *Tappi*, v. 40, Mar. 1957, p. 90A + 7 pages.

Utilization of a new fluorochemical size.

9335* Acrylic Emulsion Binders in Paper and Paperboard Coatings. P. J. McLaughlin and F. L. Schucker. *Tappi*, v. 40, Mar. 1957, p. 146-151.

Failures with high tack inks were almost entirely at the interface between coating and substrate, due to inadequate adhesion between acrylic and cellulose. "Rhoplex B-15" shows satisfactory adhesion.

9336* Sorption of Sulphuric Acid by Cotton Linters. Merle A. Heath. *Tappi*, v. 40, Mar. 1957, p. 156-158.

Below a limiting value of 3 g. per 100 g. the distribution of H_2SO_4 between the cellulose and the acetic acid is such that the ratio of the concentration on the cellulose to a fractional power of the concentration in the acetic acid is constant.

9337* The Effect of Microbiological Action Upon Southern Pine Kraft Pulp in High Density Storage. James E. Ayer, Neal C. Ford, and Jackson L. Smilie. *Tappi*, v. 40, Mar. 1957, p. 159-160.

Storage in the presence of bacterial population resulted in a decrease in α-cellulose, and a corresponding increase in the β-cellulose fraction.

9338* Polyethylene Extrusion Coatings—Adhesion and Sealability Studies. H. A. Arbit, E. E. Griesser, and W. A. Haine. *Tappi*, v. 40, Mar. 1957, p. 161-169.

Aspects of applying polyethylene extrusion coatings are reviewed and consolidated; problems related to coated foil are discussed specifically.

9339* Studies in Continuous Alkaline Pulping. V. The Effects of Chip Size and Preimpregnation on Quality and Yield. William J. Nolan. *Tappi*, v. 40, Mar. 1957, p. 170-190.

9340* Sodium Carboxymethylcellulose Retention by Wood Pulp. A. K. Wiebe and E. D. Klug. *Tappi*, v. 40, Mar. 1957, p. 197-200.

Carbon-14 techniques show that the retention in a simple NaCMC-pulp-water system was small (5 to 10%) and almost independent of the degree of substitution (D.S.) in the D.S. range 1.19 to 0.39.

9341* Reversion of Kraft Pulp as Related to Hydrogen Peroxide Bleach Variables. C. Raaka, M. N. May, R. J. Solari, and F. A. Foderaro. *Tappi*, v. 40, Mar. 1957, p. 201-208.

9342* Theory of Dyeing Polyester and Polyacrylic Fibers. W. R. Remington and H. E. Schroeder. *Textile Research Journal*, v. 27, Mar. 1957, p. 177-185.

Polyacrylonitrile fibers are dyed with anionic and cationic dyes if sites are present; otherwise disperse dyes are used.

9343* (Spanish.) Appearance of Finished Textile. **Distintos aspectos del acabado textil.** G. Delaunay. *Tintoreria Industrial*, no. 22, Dec. 1956, p. 637-648.

A description of various textile treatments, such as mercerizing and sanforizing, that cause real transformations of the fibers.

9344* (Spanish.) Protecting Mixed Fabrics Against Moths. **Protección antipolilla de tejidos mixtos.** K. Wuhrmann. *Tintoreria Industrial*, no. 22, Dec. 1956, p. 697-707.

Protecting fabrics made of wool and viscose material against the larvae of moths, museum beetles, and other insects by using "Mitin" (3%) and "Trix" pesticides.

See also: **8745** (resistance of Al to tanning materials); **8749** (corrosion in pulping liquors); **9273** (permeability of coated paper); **9287** (woodworking waste water problems); **9289** (concentration of pulping liquors).

WELDING AND JOINING

9345 The Welding of Type 347 Steels. Statistical Analysis of Effects of Various Elements on the Crack Sensitivity of Fully Austenitic Type 347 Welds. Arthur Hoerl and Thomas J. Moore. *Arcos Corporation (U. S. Atomic Energy Commission)*, NYO-3500, Oct. 1956, 26 p. (UF767 U3ny Contin.)

Carbon and Mn are shown to be the most potent elements in reducing cracking, and P and S are the strongest and most definite crack promoters.

9346* Welding Techniques in Atomic Energy Plants. I. H. Hogg. *Atomics & Nuclear Energy*, v. 8, Mar. 1957, p. 77 + 6 pages.

Special problems confronting the welding engineer.

9347 Brazing Beryllium Tubing to High-Temperature Alloy Collars. K. G. Wikle and R. Magalski. *Brush Beryllium Co. (U. S. Atomic Energy Commission)*, COO-310, June 1956, 22 p. (UF767 Un3.1co Contin.)

Brazing is accomplished by pre-placing the braze alloy between cleaned joint surfaces, imposing a small mechanical pressure on the joint, and heating to about 1470 F in a vacuum. Resultant lap joints have a shear strength up to about 7,000 to 8,000 psi. at 750 F.

9348 Dependence of Mechanical Properties of Deposited Metal Upon Arc Length in Welding With Austenitic Electrode Wire. V. S. Aristov and V. I. Sheiko. *Henry Brutcher Translation No.* 3670, 11 p. (From *Svarochnoe Proizvodstvo*, no. 4, Apr. 1956, p. 9-12.) Henry Brutcher, Altadena, Calif.

Previously abstracted from original. See item 10308, v. 5, Aug. 1956.

9349* (Spanish.) Electronic Switches and Control Equipment in Modern Resistance Welders. **Sobre la utilizacion de contactores y equipos de control electronicos en las modernas maquinas de soldadura por resistencia electrica.** A. Plaza Alonso. *Ciencia y Técnica de la Soldadura*, v. 6, Nov.-Dec. 1956, 14 p.

A study of mercury vapor rectifiers in relation to properties, mounting, and maintenance of electronic switches of the ignitron type; choice of welding cycles and control equipment.

9350* (Spanish.) Technique and Application of Plug Welding. **Tecnica y aplicacion de la soldadura en cuña.** Wilhelm Hofmann. *Ciencia y Técnica de la Soldadura*, v. 6, Nov.-Dec. 1956, 4 p.

9351* (Spanish.) Brazing and Productivity. **Productividad por soldadura fuerte.** G. M. A. Blanc and J. C. Charton. *Ciencia y Técnica de la Soldadura*, v. 7, Jan.-Feb. 1957, 12 p.

A study of the effect of modern brazing processes on prices and productivity. Examples show that brazing satisfies technical as well as economical requirements.

9352 Electric Arc and Resistance Welding. v. II and IV. 255 and 190 pages. 1950 and 1954. American Institute of Electrical Engineers, New York. (TK4660 C76e Vis.)

A collection of 43 papers dealing with arc research inert gas arc, safety, equipment, instrumentation, power supply, and resistance welding.

9353* (Finnish.) Standards and Specifications of Various Countries for Weldable Unalloyed Steel. **Hitsattava seostamaton teräs eri maiden standardien ja määräysten mukaan.** V. Linna. *Hitaustekniikka, Svetsteknik*, no. 1, Jan. 1957, p. 2-7.

Comparison of specifications in Norway, France, Germany, England, Italy, and the U. S.

9354 Rating System Simplifies Welding Electrode Selection. O. T. Barnett. *Iron Age*, v. 179, Apr. 4, 1957, p. 91-96.

Nine coated electrode specifications cover just about every requirement for manual arc welding of mild steel. Rating factors aid in choosing the best electrode type for each application.

9355* (Russian.) Structural Strength of Welded Joints During the Crystallization Process. **Tekhnologicheskaia prochnost' svarnogo soedineniia v protsesse kristallizatsii.** N. F. Lashko and S. V. Lashko-Avakian. *Izvestiia Akademii Nauk SSSR, Otdelenie Tekhnicheskikh Nauk*, no. 1, Jan. 1957, p. 103-114.

Reason for crystallization cracking in Al alloys and suggestions for eliminating them.

9356 How to Solder Stainless Steel. G. W. Hinkle. *Metal Products Manufacturing*, v. 14, Apr. 1957, p. 64-65.

Recommended procedures for surface preparation, selection of the solder, making the best joint, and finishing the job.

9357* (French.) Automatic Welding of Special Steels and Light Alloys in an Argon Atmosphere. **Automaticité du soudage des aciers spéciaux et alliages légers en atmosphère d'argon.** R. Arnaud. *Métaux, Corrosion-Industries*, v. 32, Jan. 1957, p. 38-45.

Design and operation of automatic equipment which is simple to operate.

9358 Resistance Welding. Theory and Use. 163 p. 1956. Reinhold Publishing Corp., New York. (TK4660 Am35r)

Details of all six resistance welding processes; machines, controls, and electrodes; weldability of different metals; weld quality, inspection, and testing.

9359 (German.) Advances in the Development of Rutile-Coated Welding Electrodes. **Fortschritte in der Entwicklung titansauer umhüllter Schweisselektroden.** Camille De Rop. *Stahl und Eisen*, v. 77, Feb. 21, 1957, p. 215-218.

Mechanical properties, chemical composition, and content of oxide residues in the weld metal from rutile-coated electrodes.

9360* (Russian.) The Influence of Welding on the Properties of Heat-Treated Rimmed Steel. **Vliianie svarki na svoistva termicheski obrabotannoi kipiashchei stali.** A. S. Astaf'ev. *Stal'*, v. 7, Feb. 1957, p. 158-162.

9361 Welding Electrode Selector. *Steel*, v. 140, Apr. 1, 1957, 6 p.

Data sheet contains trade names and data on firms that make electrodes for welding Al, Mg, Cu, mild and low alloy steel, and stainless.

9362 Welding and Brazing Refractory Metals. I. F. G. Cox. *Steel Processing and Conversion*, v. 43, Mar. 1957, p. 147 + 6 pages.

Argon arc welding data for Zr, Ta, and Nb. (To be continued.)

9363 (Russian.) Flash Welding Aluminum Alloy AK-6. **Svarka oplavleniem aliuminievogo splava AK-6.** A. S. Gel'man. *Svarochnoe Proizvodstvo*, no. 2, Feb. 1957, p. 1-5.

Flash welding of Al alloy containing 1.8 to 2.6% Cu, 0.4 to 0.8% Mg; 0.4 to 0.8% Mn, and 0.7 to 1.2% Si. Mechanical properties after quenching and aging of the alloy and heat treatment of the weld.

9364* (Norwegian.) Characteristic Features of Arc Welding Metallurgy. **Trekk fra buesveisingens metallurgi.** N. Christensen. *Teknisk Ukeblad*, v. 104, Feb. 28, 1957, p. 161-168.

A study of arc welding compared with classical metallurgy. Chemical aspects of arc welding. Effects of temperature and presence of H. Studies of bath, slag, and gas phase; causes of cracking; slag inclusions.

9365 An Investigation of High-Temperature Vacuum and Hydrogen Furnace Brazing. Walter E. Russell and John P. Wisner. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3932, Mar. 1957, 29 p. (TL570 Un3t)

The brazing of four heat-resistant alloys with two types of high-temperature brazing alloy. Effect of time at two brazing temperatures on the 1200 F shear strength of joints and on the base-metal properties.

9366 A Background for Evaluation of Acetylene and Propane. I. J. Okladek. *Welding Engineer*, v. 42, Mar. 1957, p. 31-34.

Properties; sources; comparison procedure.

9367 Joint Design for Making Root-Pass Welds Without Filler Metal. L. C. Lemon and W. R. Smith. *Welding Journal*, v. 36, Mar. 1957, p. 240-242.

An economical means for making sound welds without use of backing rings in stainless steel, killed steel, and Al piping.

9368 Peripheral Welding of Internally-Clad Steel for Nuclear Reactor Application. W. Leonard and J. C. Thompson, Jr. *Welding Journal*, v. 36, Mar. 1957, p. 243-251.

Special procedures for welding a spherical pressure-vessel shell made of Type 347 clad carbon-steel plate.

9369 Effect of Irradiation on Weldability of ASTM A212, Grade B. Wendell R. Hutchinson. *Welding Journal*, v. 36, Mar. 1957, p. 105s-112s.

Indicates that prior irradiation by an integrated thermal flux of 10^{18} nvt has little effect on the weldability of pressure-vessel material.

9370 A Comparative Study of Thoriated, Zirconiated and Pure Tungsten Electrodes. L. P. Winsor and R. R. Turk. *Welding Journal*, v. 36, Mar. 1957, p. 113s-119s.

Thoriated electrodes show superior starting characteristics in d.c. straight-polarity welding of stainless steel.

9371 Alloys for Brazing Thin Sections of Stainless Steel. A. S. McDonald. *Welding Journal*, v. 36, Mar. 1957, p. 131s-140s.

Suitability of Ag-Cu, Ag-Mn, and Mn-Ni brazing alloys for joining Types 304, 321, and 17-7 PH stainless steels.

9372 Properties and Weldability of High-Strength Pressure-Vessel Steels in Heavy Sections. J. H. Gross and R. D. Stout. *Welding Journal*, v. 36, Mar. 1957, p. 157s-167s.

Effects of plate thickness and of position in the plate on the mechanical properties and weldability of steels.

9373 Argon-Arc Welding and Post-Weld Treatment of an Aluminium-Magnesium-Zinc Alloy. W. T. Tyler, D. C. Moore, and C. A. Terry. *Welding and Metal Fabrication*, v. 25, Mar. 1957, p. 82-90.

Production of light-weight, high-strength, cylindrical pressure vessels.

9374 Research on Elevated Temperature Resistant Inorganic Polymer Structural Adhesives. Harold H. Levine. *Wright Air Development Center, WADC Technical Report* 55-271, pt. 2, Nov. 1956, 24 p. (TL507 Un3.18w Vis.)

An inorganic adhesive stable at 800 F, with a room temperature shear strength of 285 psi. was obtained from the ammeline-phosphorus pentoxide reaction product.

9375* (Slovak.) Flame-Pressure Welding. **Plameňotlakové zváranie.** Fridrich Skokna. *Zváranie*, v. 5, Dec. 1956, p. 360-364.

Description of process and equipment for semi-automatic butt welding of pipes, rods, etc., using oxy-acetylene flame and pressure. Offers many advantages in both quality of weld and costs.

9376* (Slovak.) Automatic Welding of Special Steels in an Argon Shielded Atmosphere. **Automatické zváranie špeciálnych ocelí v ochrannej atmosfére argónu.** Ján. Višňovec. *Zváranie*, v. 5, Dec. 1956, p. 365-372.

Results of tests to determine optimum conditions for automatic, argon-shielded welding with a consumable electrode.

See also: **8899** (ductility of welds); **8926** (welded Al tubing); **9023** (magnetic particle inspection of welds); **9320** (gluing of wood veneer).

MISCELLANEOUS

9377 American Civil Engineering Practice. Robert W. Abbett. v. I-II. Chapters individually paged. 1956. John Wiley & Sons, New York. (TA245 Ab19a)

Volume I contains metropolitan and community planning, surveying, traffic, highways, airports, railroads, soil mechanics and site planning, foundations, earthwork, tunnels, and mathematical tables. Volume II is devoted to the general fields of hydraulic, sanitary, and harbor engineering.

9378 An Analysis of a Mineral Substance From North America, Containing a Metal Hitherto Unknown. Charles Hatchett. 19 p. 1802. W. Bulmer and Co., London. (QD181.N3 H28a Over.)

Reprint of paper read before the Royal Society on Nov. 26, 1801, describing studies on a sample of Cb ore.

9379 The Use of Radioactive Dynamite as a Safety Measure in Mines. G. G. Eichholz, A. O. Smith, and A. Bauer. *Canadian Mining and Metallurgical Bulletin*, v. 50, Mar. 1957, p. 117-120.

Tests shows that Sb-124 labeled explosives can be manufactured and handled without danger to personnel or deterioration of the product. Its use enables safe location of unexploded dynamite.

9380 (French.) Applications of Statistics to Physical and Chemical Research. **Applications de la statistique à des recherches physiques et chimiques.** Alain Clavier. *Chimie & Industrie*, v. 77, Jan. 1957, p. 79-90; Feb. 1957, p. 297-311.

9381* (French.) Industrial Applications of Fluorine and Its Derivatives; Hazards to Workers and Surroundings. **Les utilisations industrielles du fluor et de ses dérivés, leurs dangers pour le personnel et le voisinage.** André Quevauviller. *Chimie & Industrie*, v. 77, Jan. 1957, p. 143-157.

Many fluorine compounds are widely used in industry but must be handled with care. Prevention problems are discussed as well as the treatment of injured personnel.

9382 (English and French.) **Collected Papers on Aviation Medicine.** 209 p. 1955. Butterworths Scientific Publications, London. (TL555 N81.1c)

Detection of epilepsy, Arctic survival, physiological requirements of pressure cabins, high intensity noise, night vision, and heterophoria are among the topics discussed.

9383* (French.) A New Operation on the Differential Forms. **Une nouvelle opération sur les formes différentielles.** Pierre Cartier. *Comptes Rendus*, v. 244, Jan. 21, 1957, p. 426-428.

Some calculations of Jacobson and Tate concerning differential forms are generalized and applied to the theory of algebraic curves and Abel's varieties.

9384* (French.) Cèsaro's Averages of Orthogonal Series. **Sur les moyennes de cesàro des séries orthogonales.** Károly Tandori. *Comptes Rendus*, v. 244, Feb. 18, 1957, p. 993-995.

An accurate order of asymptotic magnitude of an upper band of the modulus of the Nth average of Cèsaro in the development in series of a function in a segment, or of a sum of orthogonal and normalized functions.

9385 Contributions on Partially Balanced Incomplete Block Designs With Two Associate Classes. Willard H. Clatworthy. 70 p. 1956. Available from Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. (QA55 Un3.5a)

Mathematical theory relating to constructibility and modes of construction of block designs for various types of experiments.

9386 Ultrasonic Tracer Follows Tagged Fish. Parker S. Trefethen, John W. Dudley, and Myron R. Smith. *Electronics*, v. 30, Apr. 1, 1957, p. 156-160.

A single-transistor pulsed ultrasonic oscillator with 7-hr. battery life is clipped to the fish.

9387 A History of Technology. v. I. From Early Times to Fall of Ancient Empires. Charles Singer, E. J. Holmyard, and A. R. Hall, editors. **v. II. The Mediterranean Civilizations and the Middle Ages *c.* 700 B.C. to *c.* A.D. 1500.** Charles Singer, E. J. Holmyard, A. R. Hall, and Trevor I. Williams, editors. 827 and 802 p. 1954 and 1956. Clarendon Press, Oxford, England. (T15 Si64h)

Reviews man's progress in use of tools, animals, and materials to improve his living conditions and better his understanding of the world about him.

9388* **Auditing and Statistical Sampling.** Robert M. Trueblood. *Journal of Accountancy*, v. 103, Apr. 1957, p. 48-52.

Principles and applications.

9389* **The Design of In-Process Storage Facilities.** Eugene Richman and Salah Elmaghraby. *Journal of Industrial Engineering*, v. 8, Jan.-Feb. 1957, p. 7-9.

Queueing theory and probability theory are used to indicate a possible approach to the solution of an in-process storage problem in a bottling plant.

9390* **Fire Protection in the Chemical Industry. Basic Principles.** N. C. Strother Smith. *Manufacturing Chemist*, v. 28, Mar. 1957, p. 109-113.

Causes of fires and recommendations for their prevention.

9391* **Applications of Information Theory in Experimental Psychology.** William J. McGill. *New York Academy of Sciences, Transactions*, v. 19, Feb. 1957, p. 343-351.

9392 The Organization Man. William H. Whyte, Jr. 427 p. 1956. Simon and Schuster, New York. (BF697 W62o)

Portrait of the middle-class American, including his training, business activities, and home life.

9393* (German.) Problems for Future Research in Germany. **Aufgaben Deutscher Forschung.** L. Brandt. 389 p. 1952. Westdeutscher Verlag, Koln, Germany. (T177.G3 B73a)

A collection of articles by German scientists on present and future problems in German research. The review covers coal, steel and other metals, chemical industry, water resources, machine construction, electrotechnics, optics, natural sciences, medicine, and social science. Lists research institutions, associations, and societies.

9394* **A Stochastic Description of the Learning Behavior of an Individual Subject.** R. J. Audley. *Quarterly Journal of Experimental Psychology*, v. 9, Feb. 1957, p. 12-20.

Used to describe individual learning data, including both the choice sequence and the latency of the choices within the description.

9395* **Widening the Applicability of Lin's Iteration Process for Determining Quadratic Factors of Polynomials.** J. W. Head. *Quarterly Journal of Mechanics and Applied Mathematics*, v. 10, Feb. 1957, p. 122-128.

9396* **The Statistical Analysis of a Random, Moving Surface.** M. S. Lounguet-Higgins. *Royal Society of London, Philosophical Transactions*, v. 249, ser. A, Feb. 1957, p. 321-387.

Results are expressed in terms of the two-dimensional energy spectrum of the surface, and are found to involve the moments of the spectrum up to a finite order only.

9397* **Statistical Approaches to the Study of Test Precision. I. Defining Precision Standards.** Charles A. Bicking. *Tappi*, v. 40, Mar. 1957, p. 191-192.

The relation of precision to other properties of the test method, such as accuracy, is explained.

9398* (Norwegian.) Compensating for Employees Inventions. **Godtgjørelse for "funksjonaeroppfinnelser".** Tom Bryn. *Teknisk Ukeblad*, v. 104, Feb. 21, 1957, p. 141-143.

Two ways of compensating for employees inventions were studied: the plant or institute uses the inventions for its own activity, or grants licenses to foreign concerns or sells foreign patents.

9399 Chronology of Cobalt. F. R. Morral. *Wire and Wire Products*, v. 32, Mar. 1957, p. 300 + 5 pages.

Outstanding events relating to the production and use of cobalt are listed chronologically from 2680 B.C. to the present time.